

MODERN Machine Shop

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JANUARY, 1944

Contents

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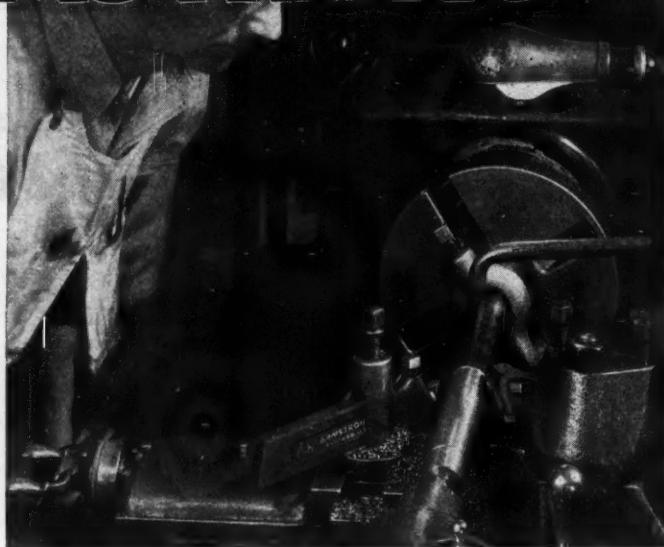
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ARMSTRONG TOOL HOLDERS Are Used in Over 95% of the Machine Shops and Tool Rooms

MODERN Machine Shop

JANUARY, 1944

VOL. 16, NO. 8

CINCINNATI, OHIO

We Present---

—as the feature article in this month's issue—an outline of the mass production methods in use in the San Diego plant of Consolidated Vultee Aircraft Corporation, builder of the Liberator B-24 bomber. The aircraft factories have multiplied in size and capacity since Pearl Harbor, with a corresponding increase in efficiency of tools and methods. Consolidated is a good example.

—on page 140—Waldo C. Wright's "Training Spurs Production at Rock Island Arsenal—a well-illustrated story on the fitting of green and inexperienced men to war jobs in a Government plant.

—on page 160—an article by A. S. Eves, Chief Field Engineer, Perfection Tool & Metal Heat Treating Company, entitled "There Is No Substitute for Good Heat Treatment. In this article, however, the author explains and demonstrates how good heat treatment is useless without good design.

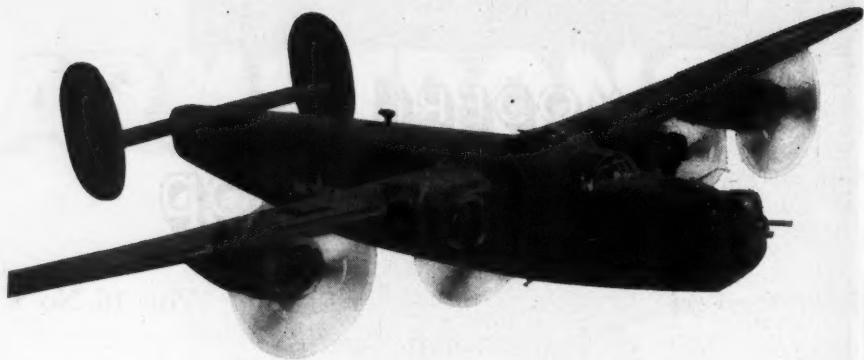
—on page 184—a short, but informative, item from Benjamin J. Stern on the disposing of excess postwar equipment.

—on page 194—"Dynamite as a Machine Shop Tool"—a story describing dynamite as a simple, effective means for removing broken brills from crankshafts. Illustrations show manner in which the explosive is employed to remove drills with maximum safety.

—on page 212—an article telling how posters featuring pictures of a toothy, smirking, leering, bestial little chap known as the "Tokio Kid" are used to show American production soldiers why and how they can save precious materials and time.

—on page 222—the designs, together with explanations, of a number of gadgets and devices that the man in the shop should find interesting as well as helpful in speeding up the performance of his tasks.

—on page 238—a section—"Modern Equipment at Work"—which illustrates and explains how certain tools and pieces of machinery are facilitating and speeding the production and handling of parts and assemblies in different types of plants.



First Flight Picture of Consolidated Vultee's Liberator Bomber Since Installation of New Nose Electric Gun Turret Shows How B-24's Face Has Been Changed. The Synchronized-Firing .50-Caliber Machine Guns Give the Liberator a Total of 13 Guns

Building "Liberators"

American mass production methods are whipping the Axis. Here is an outline of the mass production methods in use in one of America's great aircraft factories.

By C. W. GREAVES

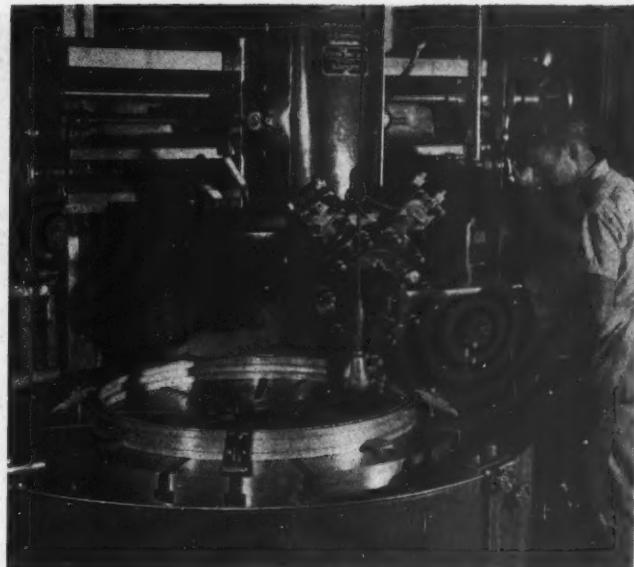
NOT only has the Liberator B-24 bomber emerged from the war thus far as No. 1 heavy bomber, but one of the vast plants which builds them has set an outstanding production record. Recently, the San Diego plant of Consolidated Vultee Aircraft Corporation received official recognition for having made more heavy bombers in one month than any other plant in the country. At the same time, they were made at a lower cost per pound than any other American bomber. How was this record achieved? There are many reasons, but production men at Consolidated Vultee will point out a few salient ones.

Application of mass production

methods to aircraft manufacturing is the overall reason why Liberators are rolling off assembly lines by the hundreds every month. There was a warming up period before the full effect of these methods was realized, like the heating of a radio tube before electrons streak through it. But now that this vast plant has reached a high rate of production with everything down to the smallest machine in the shops synchronized for smooth operation, a look at its system is worth while.

You would expect to find a minimum of employee idleness in a plant with a production output per employee far above that of the national average. And it is apparent in mak-

A Gun Ring, to be Used in the Nose Turret of a Liberator B-24 Bomber, is Being Machined in this Bullard Vertical Turret Lathe

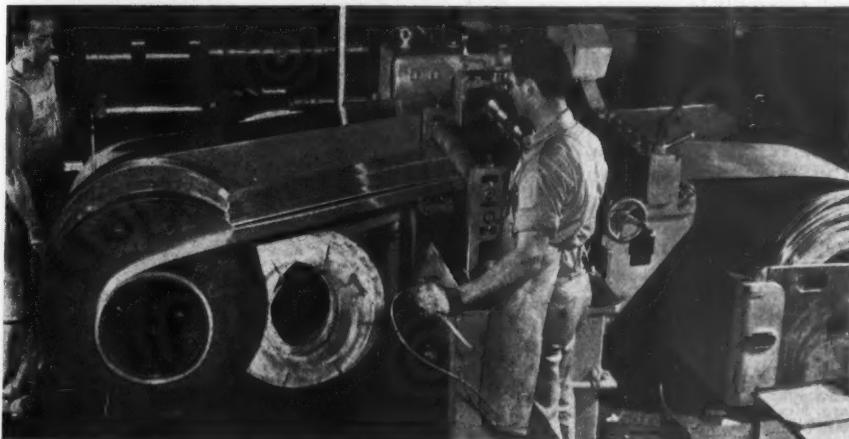


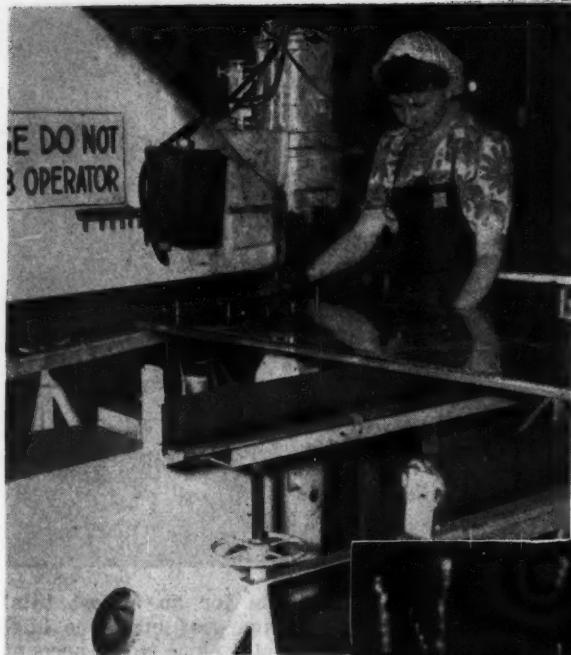
ing an inspection tour over several million square feet of factory area that management has planned carefully to utilize the full productive capacity of each employee. The task of scheduling production for many thousands of different kinds of parts is a difficult one.

Undoubtedly the scheduling of production to permit prompt dispatch of materials and assemblies to machines and assembly departments is an im-

portant reason for an almost total lack of machine and employee idleness. This factor alone would account in large measure for the records of

This Slitting Machine is Cutting Alclad 0.091 at a Rate of 100 Feet Per Minute in Consolidated Vultee's San Diego Plant. Rolled Sections are Made from the Smaller Coils on a Yoder Rolling Machine



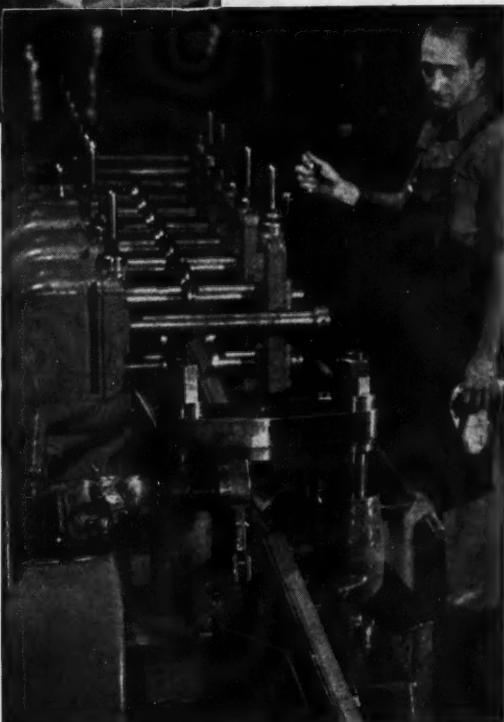


Riveting a Fuel Access Door for a Liberator Bomber. The Foot-Controlled Erco Riveting Machine Does the Job in Thirty Minutes; the Same Job by Hand Takes One and One-Half Hours



bly line. Outer wing panels, engines, gun turrets and other accessories are mounted here also.

In making detail parts for these assemblies, fabrication departments make over 50,000 for each bomber. The sheet metal department with batteries of shears, punch presses, saws,



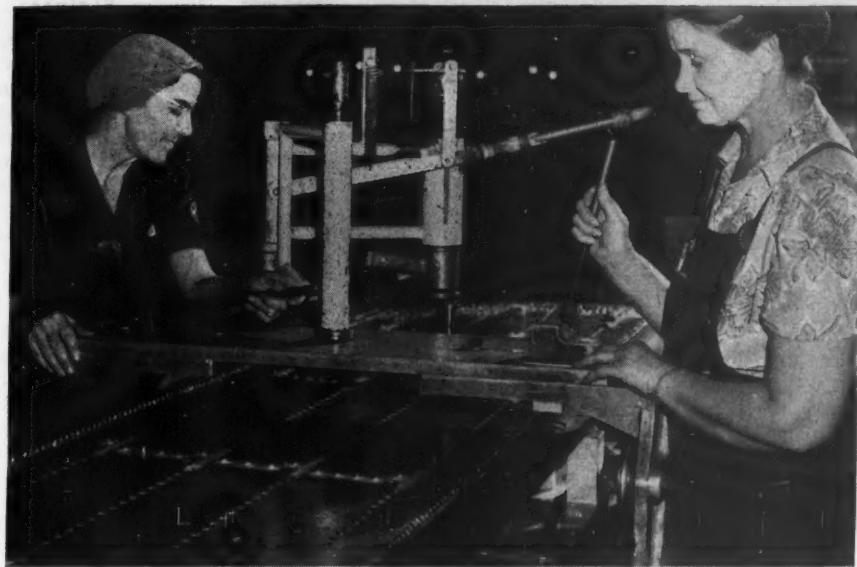
individual employee output established here.

But shop organization, methods of processing materials, improved tooling, and new assembly techniques have contributed to making these production records possible.

Basically, the Liberator B-24 is made in three large sections: (1) Wing center section; (2) Nose fuselage; (3) Tail fuselage. This triumvirate becomes a bomber when the three sections are joined together on the final assem-



Thousands of Feet of Rolled Sections are Made Daily on Yoder Rolling Machines. A 90-Degree Section is Shown in Process Here



By Using Tools Especially Designed for Them, Women Workers are Enabled to Do a Variety of Jobs Formerly Done by Men. Shown Here is a 200-Pound Drill Templiet Which Moves on Rollers, and Which is Raised From Drilling Position for Moving by Raising the Cam-Lever Handles. The Drill is Used to Drill Fuel Access Doors for the Liberator

drills, brakes, and so on turns out approximately one million parts every week. An important factor in producing this volume is the layout of the department, which has been arranged to allow straight line flow of parts wherever possible.

Plant layout engineers studied the sequence of operations on a large number of representative parts. From this data, a percentage flow table was prepared, and machines were grouped in order to allow straight line flow for a high percentage of sheet metal parts.

Improved tooling in this department has been a contributing factor also. The introduction of blanking and piercing dies has eliminated much of the drilling formerly done by hand. The use of large blanking presses has increased production of many parts formerly made with radial routers. In

connection with large blanking presses, dies are set up for some parts so that more than one job can be blanked out at a time. This same principle is applied to shears where multiple cuts are made at the same time.

The installation of high cycle drilling equipment resulted in very substantial savings in man hours. With this equipment, several parts can be drilled at the same time.

Foremen say that enforcement of safety rules has been an important factor in increased production. Before safety devices were installed, one department averaged a finger accident every day. To prevent such casualties, guards have been placed on saws and air safety devices on punch presses. Dual controls are installed on multi-punch machines when two operators are working. Wearing of goggles is mandatory for operators



Trunnion Fixtures Such as This One, Which Make It Possible to Adjust Sections to the Best Working Positions, Have Speeded Up Production of Liberator Bombers. The Workers Shown Here are Working on the Assembly of an Outer Wing Panel



on saws, routers, and shapers.

These improvements in the sheet metal department are typical of others in the machine shop, draw bench, tube bending, drop hammer, electric bench and welding departments. The aggregate effect of numerous small improvements throughout all departments is manifested in production figures, which over a period of 18 months nearly doubled while at the same time employment figures increased but slightly. These departments have been able to feed a growing stream of parts to the assembly departments, which in turn have also adopted new methods to meet heavy production schedules.

The 55-foot wing center section, one of the three major assemblies, is started in a vertical buck. The first section laid down is the front spar. Bulkheads are then added, stringers are riveted into position, and the rear spar is attached. Finally, the outer skins are riveted into place. From this vertical position the wing center sections are hoisted to a horizontal line where accessories and

carriages for delivery to the final assembly building.

The wing center section requires more man-hours than any other section in the bomber, and tooling is in progress which will further speed up production of wings. They will be made in several sections which will be assembled in the vertical bucks. This development will enable employees to work on simpler sections, with greater freedom of movement and away from noise and confusion resulting from highly concentrated areas.

The nose section of the fuselage requires a considerable number of man-hours to build, particularly because so many accessories are installed here. Over 13,000 feet of wiring and 2,000 feet of tubing go into it. The pilot's flight deck with all flight controls and instruments are located here, too. Until a few months ago, this section was constructed as one unit and equipment was mounted after the shell was made. This practice resulted in a serious bottleneck because not enough employees could crowd into the inside to complete

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their tasks on schedule.

Production engineers have planned so that the section is built in a buck, leaving rivets out along certain cleavage lines, and the section is then broken down into five panels. Wiring, tubing and other accessories are mounted on these panels, which are then mated together again and riveted into place. Man-hours were slashed considerably under this method. Only one-third the former number of workers are now needed to turn out over 33 per cent more sections.

The tail section of the fuselage is constructed in a buck, similar to the method of making the nose section. Compared to the forward part of the fuselage, however, only a small amount of equipment is installed in the tail section, so it is permanently riveted together in the buck. From here it is hoisted to another line, where the accessories are installed. After its trip to the paint booth, a special carriage is used to transport it to the final assembly line.

The three sections—which have grown in size and equipment on major assembly lines—are mated on the B-24 final line. Special lifting fixtures and over-

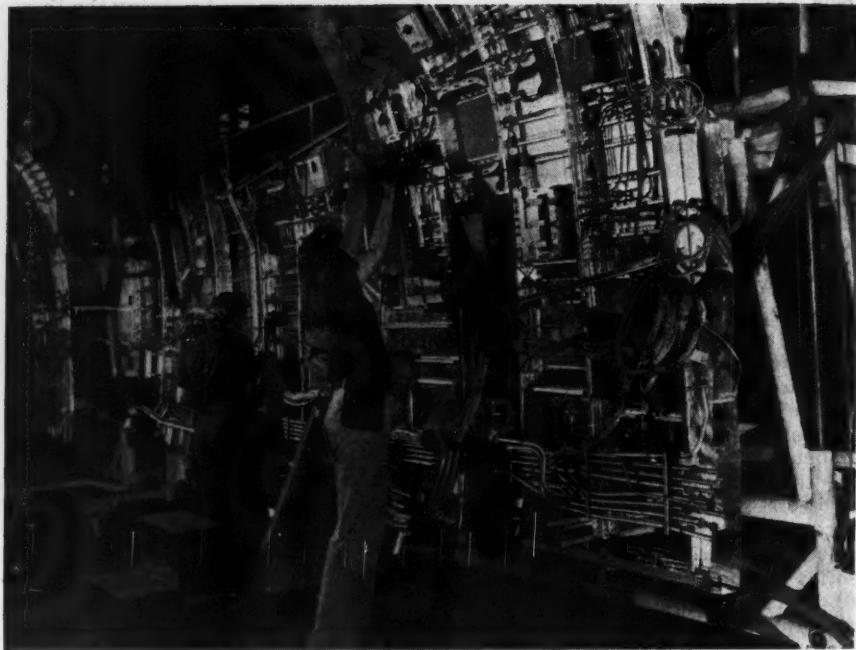
head hoists are used to bring the three main sections together.

From here the bomber starts on the last lap of its journey through the plant. As it moves down the first mechanized line for heavy bombers placed in operation, other units are added. The four gun turrets are installed. Outer wing panels are bolted to the ends of the wing center section, the twin rudders are added, and for the first time the bomber assumes the distinctive appearance of a giant Liberator B-24. With overhead hoists, each of the four Pratt & Whitney engines is lowered into position and bolted to the wing.

Employees swarm inside to make final connections of wiring and tubing. Over 60 instruments are installed in the flight deck and other parts of the bomber. Several metal oxygen bottles for use in high altitude flights are



Here the Keel Has
Been Laid for a Liber-
ator Wing. The 55-
Foot Spar Is in Posi-
tion; Bulkheads,
Stringers, the Rear
Spar, and Finally,
Skins will be Added
Before the Wing Is
Lifted to the Horiz-
tal Line



Mounting Accessories on a Nose Fuselage Panel. When the Panel Has Been Completed, It Is Mated With the Other Nose Fuselage Panels and Riveted In Position. Building the Section in Panels Allows Ample Room to Work

added and technicians install an elaborate radio system.

By the time the bomber reaches the end of this line it is practically ready for its first test flight. During its journey down the line, military and company inspectors have examined every installation, but at the end of the line a very comprehensive inspection is made before the bomber is released for test flights.

In this final assembly department notable progress has been made over a period of months. With an increase of only five per cent in man-hours, a production output of 104 per cent has been achieved. Here again the practice of making sub-assemblies on benches and assembling the complete unit has helped to speed up produc-

tion on this line. Instead of installing instruments one by one, they are placed in panels and then the entire panel is mounted. Ammunition racks are assembled on benches, then installed as one unit in the plane.

The three factors which make up the production picture are men, machines and materials. According to Consolidated Vultee experts, the greatest of these is man-power. Properly trained and supervised employees can put the production chart in a steep climb, so attention is focused on man-power—or to be more exact—woman-power, too, because nearly half of the workers on Liberator bombers are women.

In connection with training employees, free courses are offered, in co-

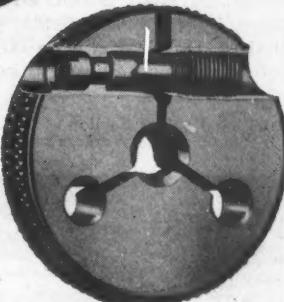


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Because the **PERFEX GAGE & TOOL COMPANY** has specialized in the manufacture of standard thread plug and ring gages it is able to fulfill its promises on deliveries to those manufacturers who are urgently in need of thread plug or thread ring gages.

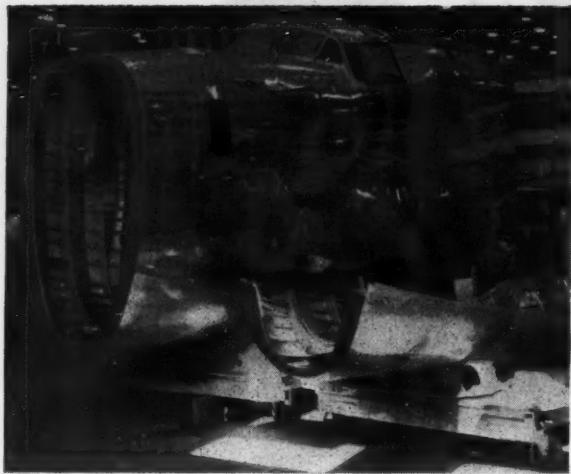


The above illustration shows a thread ring gage and a cut-away view of its locking device. Like all **PERFEX** gages these ring gages are made under the personal supervision of men who have had years of experience in precision gage and tool manufacture. Each **PERFEX** gage is checked and rechecked in air-conditioned inspection rooms before they are shipped. This insures extreme accuracy and eliminates costly delays in rejects by the customer.



Wire or write your order today, sending complete specifications and blueprints.

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and TOOL CO.**
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This Nose Fuselage of a Liberator will be Broken Down into Five Panels to Facilitate Installation of Accessories. On the Right is the Bottom Panel of One that has been Disassembled

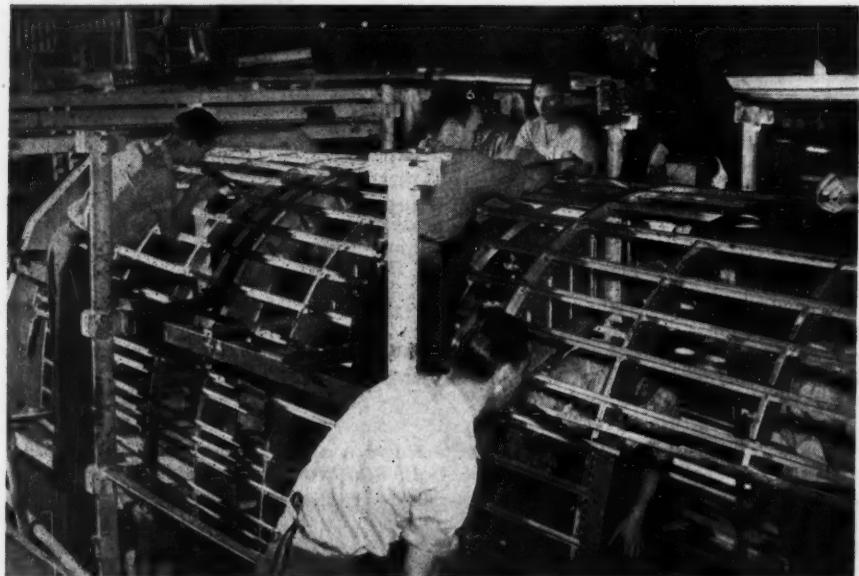


courses, which include training on all types of machines used in aircraft production. Electrical and radio classes are held, and courses from elementary mathematics to college-grade engineering subjects are offered.

Special courses are held for all supervisory personnel. This training, which is mandatory for employees in this category, emphasizes the methods which are most effective in handling men

operation with public education systems, in numerous fields. Over a period of 18 months approximately 40,000 employees have taken training

Building the Tail Section of the Fuselage, For Which a Type of Jig is Used That is Known as a "Buck." The Workers are Starting to Cover the Structure with Sheets of Aluminum Alloy



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METAL DRILLING MACHINERY



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THE CINCINNATI BICKFORD TOOL CO.
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ARM LINCOLN
ARMY & NAVY
RADIAL
BULLETIN R-24

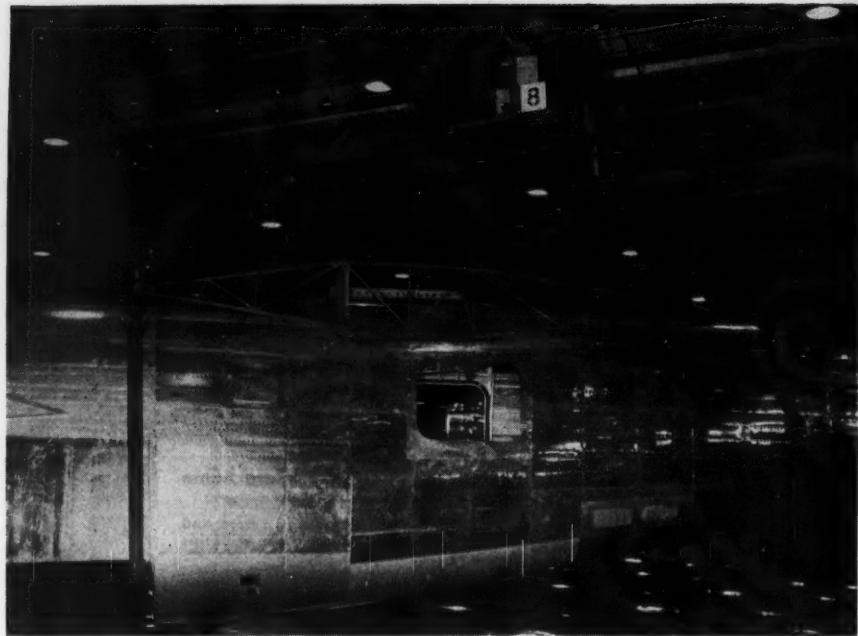
21", 24", & 28"
ROUND
and BOX
COL. UPRIGHTS

BULLETIN U-25

THE CINCINNATI BICKFORD TOOL CO.

METAL DRILLING MACHINERY





This Tail Section of a Liberator Bomber is Being Hoisted From the Buck in Which It was Built to a Line Where Accessories Will Be Installed

and women working in shops and on assembly lines.

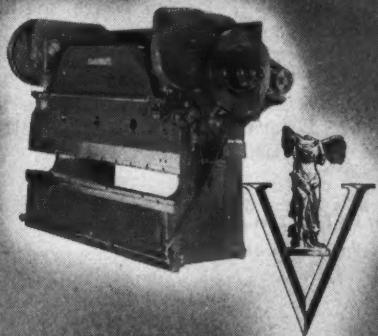
One very important factor at Consolidated Vultee is the close attention management gives to the daily production trend. Each morning the factory manager calls his superintendents in for a short meeting to discuss the previous day's production. Charts kept in his office reflect the man-hours required to fabricate each major assembly, and these are kept up-to-date.

From the peak man-hours required months ago, the lines invariably show a steady decline, like a long ski course with occasional slight elevations. When one of these occur, the factory manager asks a superintendent: "Bill, what caused this increase in man-hours per unit yesterday?" Bill always knows. Sometimes it may

be due to an unusual increase in employee absenteeism, making it necessary for the jobs to be done by less skilled workmen. A shortage of parts, a condition which has not been entirely eliminated due to design changes, may cause delays and a consequent increase in man-hours. The reason is always evident, due to a control system in operation, and appropriate action can be taken to remedy it.

Ideas contributed by employees have been an important factor in speeding up production. During the last year nearly 14,000 suggestions have been received in the San Diego plants from workmen and supervisory personnel. While not all of them are useable, a large percentage have been adopted. These speed-up ideas have resulted in saving nearly twelve million man-hours during the last

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SHAPERS • SHEARS • BRAKES



At This Station the Three Sections of the Liberator are Mated and It Starts on the Last Leg of Its Production Journey

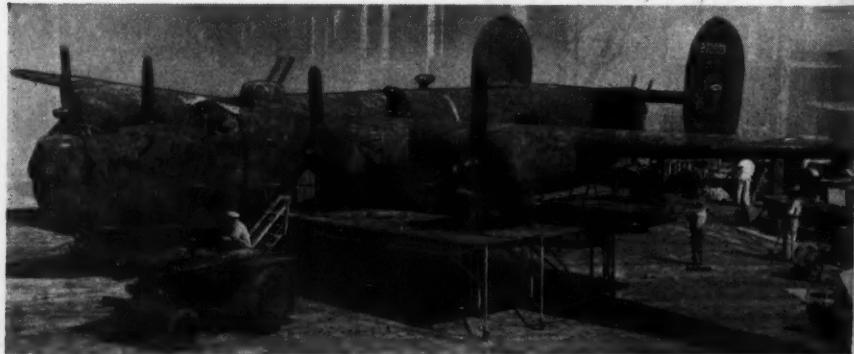
year; converted into dollars, the net savings amounts to over eleven million dollars.

The aggregate effect of all these factors has been an increase over a period of months of 160 per cent in production of Liberator bombers while man-hours required to build each plane have been cut 50 per cent.

An examination of the latest pro-

duction charts indicates that lines representing man-hours are pointing down, while the production lines are still climbing. On one chart, the lines crossed long ago and are getting farther apart each week. All of this augurs well for even greater production records in the near future and more Liberators to speed the setting of the "Rising Sun."

Tractors are Used to Pull the Completed Liberator B-24 Off the End of the Assembly Line. It is Now Practically Ready for Its First Test Flight





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ANGLE GAGE BLOCKS!

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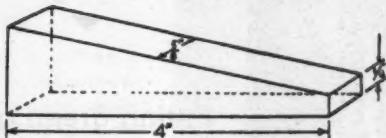
An absolutely **NEW** method for all
precision angle measurement

Webber Gage Co.—largest manufacturer of gage blocks exclusively—proudly offers industry its latest achievement—**WEBBER ANGLE GAGE BLOCKS.** • Product of years of research and development, these blocks provide for the first time a simple, fast, sure means for precision measurement of angles—at a cost within the reach of every shop.

● A MILESTONE IN MEASURING ●

Facts about WEBBER ANGLE GAGE BLOCKS

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2nd Series—Minutes—1 - 3 - 9 - 27

3rd Series—Seconds—1 - 3 - 9 - 27

A complete set of WEBBER Angle Gage Blocks will yield any angle from 0° to 105° —a total of 370,800 angles—in steps of 1 second of an arc.

Working surfaces are optically flat—blocks wring together and adhere same as regular gage blocks.

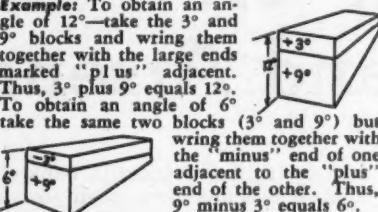
Every set includes a parallel and knife edge.

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Webber Angle Gage Blocks are used for precision measurement of angles in the laboratory, inspection room, shop, etc. To obtain a desired angle, blocks are selected from the set which when added—or subtracted—will yield that angle. These blocks are wrung together and will adhere just as with gage blocks.

Example: To obtain an angle of 12° —take the 3° and 9° blocks and wring them together with the large ends marked “plus” adjacent. Thus, 3° plus 9° equals 12° . To obtain an angle of 6° , take the same two blocks (3° and 9°) but wring them together with the “minus” end of one adjacent to the “plus” end of the other. Thus, 9° minus 3° equals 6° .

Very little study is required to comprehend how 2 or more Angle Gage Blocks may be wrung together to produce any angle in degrees. The blocks in minutes and seconds are combined in the same manner and added on.



In the minute and second series only 4 blocks are needed which will combine to form up to 30 minutes. If 32 minutes is required—simply add to the original measurement one more degree (60 minutes). Then subtract 28 minutes from this—leaving 32 minutes which was required.

No mathematical computation is involved in using WEBBER Angle Gage Blocks. With each set is furnished a table showing which blocks to use and how to combine them to get any angle required. Precision angle measurement is reduced to an extremely simple, fast, sure operation.

If after long use or extremely hard wear, they become damaged or inaccurate, they can be returned to WEBBER Gage Company, and restored to “like new” condition at a modest cost.

Absolute accuracy is assured since proof of the accuracy of the blocks is contained within the blocks themselves. This is true of gage blocks for linear measurement. Example—wring together any number of gage blocks to make a size equal to that of a single block. Then the group of blocks will check perfectly with the single block. By this principle—if the largest block in the set is correct then all the other blocks in combination checking with it must also be correct.

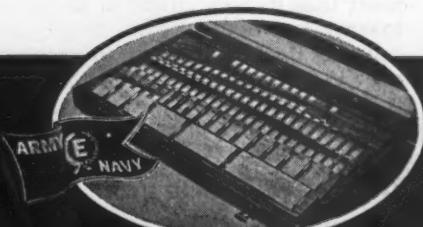
This principle applies in checking WEBBER Angle Gage Blocks inasmuch as the starting place is a straight line (instead of the largest block in the set as above) and a straight line can easily be checked by optical means.

WEBBER Angle Gage Blocks are guaranteed accurate to within $\frac{1}{5,184,000}$ part of a circle. Such accuracy, obviously, cannot be checked with the usual shop tools any more than regular gage blocks can be checked with a micrometer.

**A limited number of sets of
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prices furnished on request.**

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New Men are Taught by Assigning Them to Work with Experienced Machinists with Whom They Work as Helpers and From Whom, in Turn, They Receive Instruction

Fitting green and inexperienced men to war jobs in a Government plant

By WALDO C. WRIGHT

Training Spurs Production At Rock Island Arsenal

WITH an inevitable shortage of skilled men this winter, with more insistence by the War Manpower Commission that contract companies set up comprehensive training programs, to what extent does Government take its own advice in its major arsenals?

Today Rock Island Arsenal employs over 15,000 men who work seven days a week on 1,200 items of Army ordnance ranging from bayonets to artillery carriages. To gear farm boys,

service station attendants, bank clerks and pick-and-shovel men to work hand-in-glove with skilled armament machinists and tool makers has poised a challenging training problem at this giant mid-west arsenal.

By three main plans productive workers are trained or retrained in new skills, such as that of cutting tank tread sprockets by oxygen flame. First, youthful workers pursue a long-range apprentice program; second, older workers with evident aptitude

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Apprentices are Given
a Wide Range of Ma-
nipulative Experience
and Full Instruction
in the Technical Prin-
ciples Upon which
these Processes
are Based

learn advanced
machine tool prac-
tice under skilled
men and thus pre-
pare for the next
higher job, and
third, the less able
manual workers
are upgraded by a
part-time assign-
ment to slightly
more difficult jobs.

Rock Island
agrees with lead-
ing educators that
the best time to



learn anything is
when it can be put
into practice. Thus
interest and func-
tion merge and the
trainee bene-
fits by the added
stimulus of evi-
dent progress.

Apprenticeships
were revived five
years ago as the
true - and - tried
way to develop
skilled mechanics
and tool makers.
Two of the four

Many Old-Time Me-
chanics Are Back on
the Job, But Need Re-
fresher Training in
Recently-Developed
Methods



Close Supervision Encourages Apprentices to Develop Skills to a High Point of Perfection

a week apprentices assemble for classroom instruction. Related technical training is scheduled to keep a pace ahead of shop experience.

These young workers are eager, even in these times of pyramiding wages, to forego quick returns and undertake a long-range training pro-

gram. For instance, recently it was announced that 25 youngsters would be selected for a new class. It brought 1,200 applications from workers 18 to 25 years of age scattered through every department of the vast Rock Island plant.

Eighty-four apprentices are taking organized courses of study from the International Correspondence Schools. Their training supervisor reports five grades below ninety. Foremen say that these trainees are also acquiring habits of neatness and accuracy as well as displaying greater self-reliance.

years of indenture were devoted to running lathes, shapers, drills, milling machines, and grinders. During this period, as far as practical, the apprentices turn, drill and grind on items of scheduled production.

During the second two years, the apprentice goes the round of pattern work, foundry, forge, heat treatment, and physical laboratory testing. During this period every job belongs on the production line, and has to pass inspection.

Related information is given by correspondence courses. One afternoon

ANDERSON HAND SCRAPER and BLADES



One blade is equal to an ordinary hand scraper reforged about 5 times. When it is worn out a new blade makes a new scraper. Blades need stoning but no grinding. Blades are

$\frac{1}{8}$ " thick from end to end and of correct hardness. Three sizes: $\frac{3}{8}$ ", 1", $1\frac{1}{4}$ ".

Try these fast, cost-cutting tools.

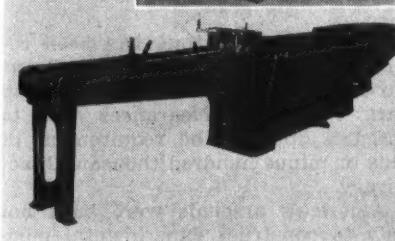
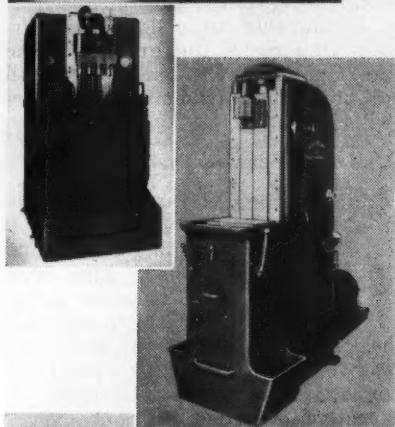
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THIS AIRCRAFT ENGINE PLANT DOMINATES

its All-American Team



BROACHING IS BETTER

THE *American*
WAY



So high is the production-with-precision obtained by broaching that one machine is ample for most metal working plants. Few have as many as 10 or 15.

Consider, therefore, the importance of this particular aircraft engine plant in the broaching picture, with 91 American machines!

Their personnel *knows* broaching. They know the value of dealing with an old-line company whose principals have been identified with broaching since the turn of the century. They know, too, the importance of a *complete* broaching service—machines, tools, and engineering—for winning war production, profitable post-war production.

Significant is this overwhelming vote of confidence in American Broach equipment.

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PRESSES
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SPECIAL MACHINERY



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HANDY-
PRACTICAL

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air
GRINDER

Kipp Air Grinder Model H is used in thousands of tool rooms and production departments. It's fast... 50,000 R.P.M., has a handle grip, more power, with controlled speed. Order today... prompt deliveries on higher priorities.

ONLY

\$29⁷⁵

Model H

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200 WASHINGTON STREET
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and willingness to assume responsibilities.

In the exigencies of war production, Arsenal management has redrafted the entire apprentice program on a two-and-a-half year basis. One of the techniques for increasing the training tempo was to pare off non-essentials, so that trainees will specialize in war production. They will be given more engineering training and greater technical insights into heat treatment, cutting speeds, X-ray inspection of castings, conveyor belt assembly.

They will spend less time on routine machine operation, take on a schedule comparable to cadet engineers. Those who make the grade are the future potential leadmen, foremen and shop superintendents of the Arsenal.

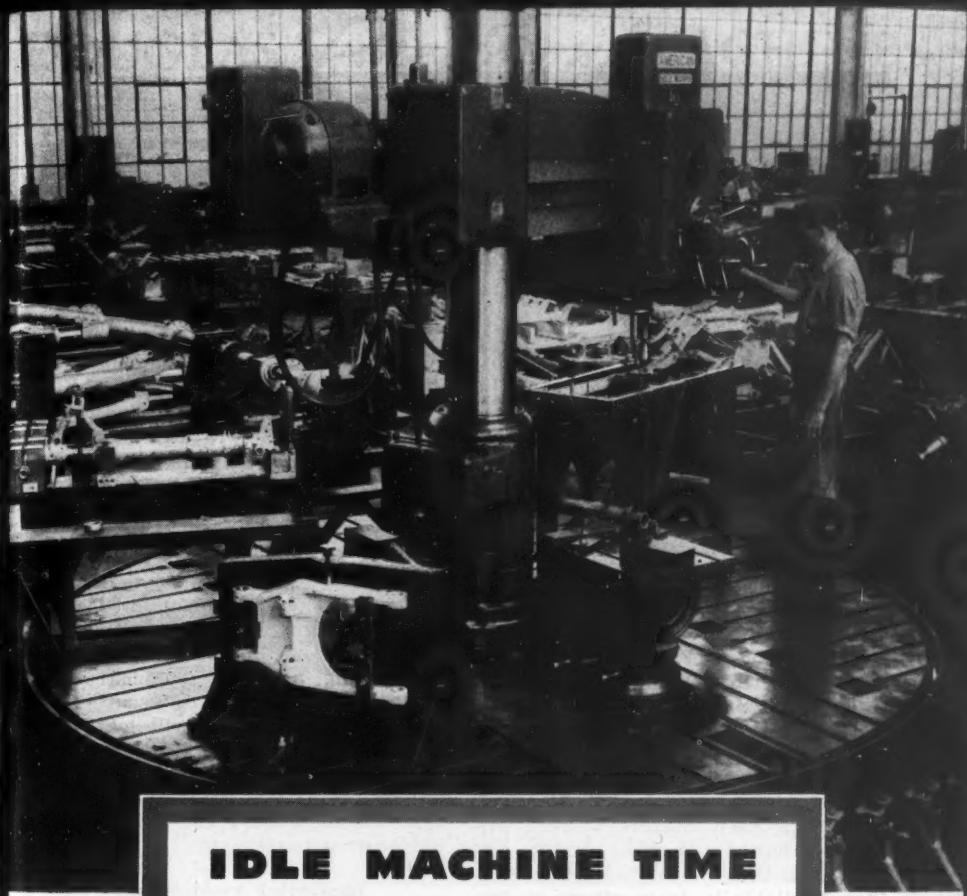
In-Service Training

Adult training is the second problem of an expanded production schedule. For every tool maker normally required, 31 are needed. Also, with new production methods such as the oxygen flame which cuts out sprocket wheels eight times faster than machine tools, older workers have to be taught new operating techniques, irrespective of broad previous experience.

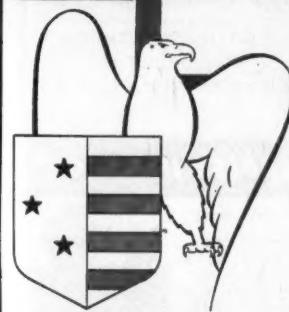
While roughing time has been reduced, assembling of parts made at various plants requires that moving parts meet close clearances. So, to speed is coupled the requirement of plus or minus hundred thousandth accuracy.

America's arsenals were built not only to construct experimental models of new weapons conceived on drawing boards, but to set standards and develop operating methods for the guidance of peacetime plants converted to war work.

Considering that dual objective, Rock Island Arsenal feels its responsibility not only to turn out parts, but to turn out trained men, against a



IDI LE MACHIN E TIME **ELIMINATED**



As the illustration shows, this "American" Hole Wizard Radial Drill is equipped with a circular base. This base permits multiple work set-ups for successive operations, thus completely eliminating idle machine time resulting from changing from one work set-up to another.

This is one plant's contribution to solving the man power shortage. By keeping its machines in constant operation, it reduces man power requirements to an absolute minimum.

"American" Hole Wizard Radials are meeting the demands of such continuous service.

THE AMERICAN TOOL WORKS CO. CINCINNATI, U.S.A.

Lathes and Radial Drills



Much of the Arsenal Work Calls for Coordinating and Provides an Opportunity for "Incidental Assignments" for Upgrading

Some idea of the possibilities of the plan can be gained by reviewing its accomplishments. Within a year 350 Civil Service employees have had their rating and pay changed from the status of laborer to machine operator.

In-service training on manipula-

tive work places responsibility for the correct teaching techniques on foremen and leadmen. Foremen are taught that telling, alone, or demonstrating, alone, is not enough to assure that the in-service worker will learn the key points and acquire the knacks of the job. There must be eternal patience, correction of errors, encouragement and supervision as the learning process takes hold.

Incidental Assignments

The third leg to mass training at Rock Island Arsenal aims to help older civil service employees and men

REYNOLDS Coolant Units for Machine Tools

No. 206 (left) Approximately 15 gal. capacity P.M. Tank 20" x 16" x 16". $\frac{1}{4}$ H.P. motor. For grinding machines, multiple spindle drills. \$95.00 each for the 110 volt 1 phase model, and 220 volt, 3 phase model. \$112.00 for

"KEEP 'EM COOLER IN ACTION"

the 550 volt, 3 phase model.

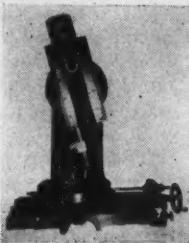
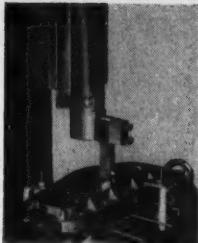
No. 1-s (right) Approximately 7 gal. capacity P.M. 16" x 10" x 11" tank. $\frac{1}{4}$ H.P. motor. For Milling and Screw Machines, Lathes, etc. \$98.50 each for 110 volt 1 phase model, and 220 volt, 3 phase model. 550 volt, 3 phase model, \$108.50.



REYNOLDS MACHINERY CO., 211 EDDY ST., PROVIDENCE, R. I.

DOUGLAS *Precision* MACHINES

The Douglas Precision Slotter is adaptable to both tool room and production work. Swiveling ram head with tool holder and rotary table often solves the problem of costly fixtures. Automatic feeds in all directions - 7" to 10" stroke.



Typical production parts machined
on a Douglas Slotter.



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War Plants

The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available to set up machine for single purpose jobs such as cylindrical, internal and radius grinding.



Operation showing set-up for
internal grinding.



Operation showing set-up for
sharpening straight gash hobs.

DOUGLAS MACHINERY CO., Inc.

150 BROADWAY

NEW YORK, N. Y.

who haven't worked for years. They need refresher or broadening training to make them more effective in new processes and new products.

For instance, many a retired tool maker is back on the job in Shop M, proud of his ability to grind a taper or cut a fine thread, but more skilled in hand than in machine tool processes. By this plan of incidental assignments, employees too old to undertake apprentice training and without sufficient initiative or ability to hit the pace of in-service training work part-time on more difficult jobs.

When this effort represents over twenty-five per cent of the employees' time, time spent on these more difficult jobs is credited by the Civil Service Commission. When employees have served the time necessary to qualify for more responsible jobs, they are promoted to such jobs full-time and given corresponding increases in pay. Obviously, this plan

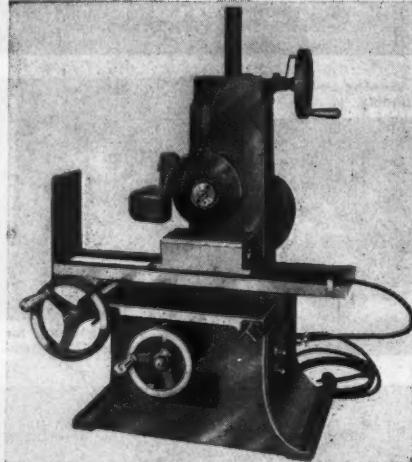
results in broadening the craft usefulness of both previous and new employees. Veterans in arsenal production display new interest with a resulting increase in morale and production and a reduction of spoilage and accident rate.

Voluntarily, many of the men in in-service and incidental assignments avail themselves in their spare time of emergency defense classes, vocational courses and correspondence courses. Blueprint reading, shop mathematics, and mechanics are most popular.

These shop practice courses cover such subjects as welding theory, machine tool grinding, heat treatment practice, tool designing, machine sketching, drafting, and its more simple application of blueprint reading and machine sketching, also the use of precision instruments and gages.

Of a group of over 200 adult correspondence students, 40 per cent were

Sanford Precision Bench Surface Grinder



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FOR ALL
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THREADED PLUG GAGE

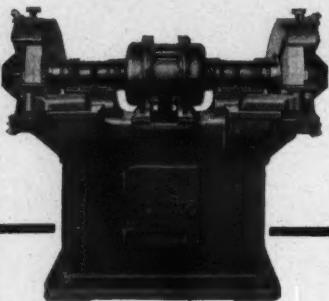
Threads smaller than the papillary ridges of a finger, ground to an accuracy of .0001 of an inch — that's what you get when you buy a VARD 0-80 NF Threaded Plug Gage ★ We specialize in the manufacture of extra fine, Right or Left Hand threads, special thread forms and extreme tolerance gages ★ In some of the standard thread sizes in NEF, NF and NC gages, from sizes 0-80 to 1½ in., we can supply gage members out of stock. These fine threads as well as special threads can also be obtained in any size ranging from 0-80 to 12 in. and can be made to fulfill your requirements. Deliveries are being handled in a reasonable period of time ★ VARD gages are made from special tool steel, hardened, ground and lapped. They are tested on the most exact mechanical and optical inspection equipment and



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come to you in waterproof cellophane enclosures, securely packed in individual boxes ★ Write for more complete information on any VARD products.

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BRIDGEPORT Floor Grinders

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BRIDGEPORT Floor Grinders will withstand all kinds of service, hard work and abuse—day in and day out.

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BRIDGEPORT
Safety Emery Wheel Co., Inc.
1297 W. BROAD ST. BRIDGEPORT, CONN.

devoting most of their studying to shop practice, absorbing information which they could apply directly on their jobs—often the following day. Twenty of the group were ambitious enough to undertake complete mechanical engineering courses, with special emphasis on tool design and metallurgy. These ambitious men in their thirties and forties are each investing up to 1,400 hours of spare time study to multiply job effectiveness at least ten times.

Training for Field Workers

When American arsenals and workshops have ground out the materials of war, field experts must be available to handle property control, keep records of service and plan distribution. These administrative technicians, after meeting high entrance standards of education and engineering experience, are required to complete a six-week course in Army administrative procedure.

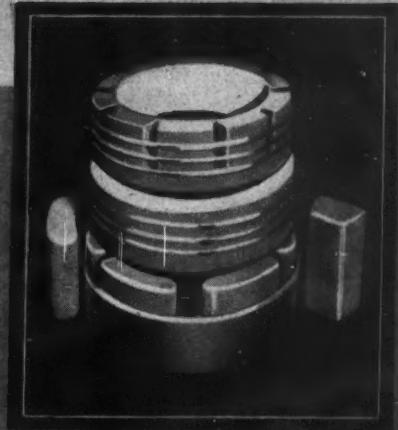
Likewise, ordnance inspectors, before they can be assigned to check standards of manufacture of Army ordnance, attend a six-week specialist course in modern inspection methods. There they learn to use precision instruments, and master the metallurgy and metallography of ordnance metals. They also familiarize themselves with the nomenclature and assembling of artillery carriages, tanks, machine guns, and gun recoil mechanisms.

In spite of the pre-employment check on basic education, many of these inspectors need refresher training in mathematics, blueprint reading, use of surface gauges and reading of verniers and micrometers. Six weeks at school overcomes much of this handicap.

Following this first training period, those potential inspectors who show exceptional ability are selected for advanced courses, including chemical

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Making the Chips Fly on War Production are Former Service Station Attendants, Truck Drivers, WPA Laborers and Salesmen

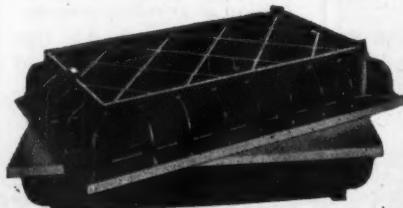
and physical laboratory practices. During this period they carry on under the guidance of experienced inspectors, specializing in gun carriages, tanks, or whatever phase of ordnance production they are to cover at their assigned plants.

By means of slide films, discussion groups and planned group activities, these key men are schooled to adjust

themselves to any plant where they may be sent and are made more articulate in solving problems in personal relations, which inevitably arise while they are setting up and enforcing inspection standards.

Vital to ordnance work in the field are armament machinists. These men are needed at every camp, post, depot, and training center with the arm-

REID PRECISION-PLANED SURFACE PLATES



Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015". Thoroughly normalized and weather seasoned Reid Precision-Planed Surface Plates have proved thoroughly satisfactory on work to close limits. Excellent delivery—Write for prices—details.

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Training for Such Jobs
as This Can Only be
Acquired in Actual
Production

Sixteen weeks are spent teaching these men the names of the parts of rifles, machine guns and artillery. They learn in small groups by disassembling and assembling the parts, during which they determine the functions and operations of each part. As soon as they qualify, they are assigned to mobile ordnance shops in the field to make repairs on the guns, jeeps, and tanks which fail in service.

Those potential armament machinists who have not had machine

ed forces, where they keep the equipment in firing trim. Many of these men shy from lectures and classrooms, and feel more at home in handling tools than in talking about them.

tool experience but meet other qualifications are sent, a hundred in a group, to Dunwoody Institute in Minneapolis, where they complete a six-month course in shop blueprints, machine



HINGES

VARIOUS WIDTHS
and GAUGES

BUTTS AND
CONTINUOUS LENGTHS

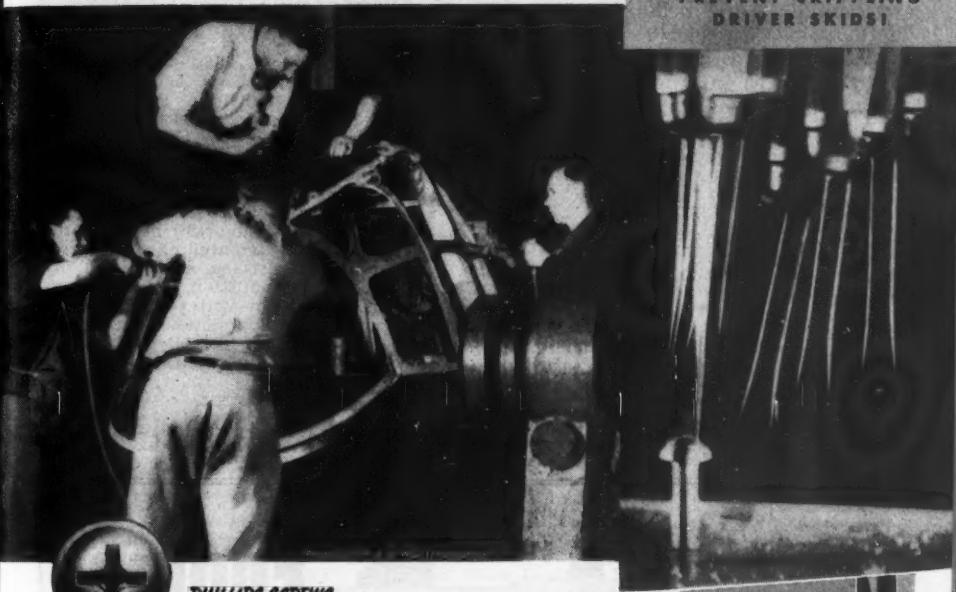
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Screws. There are no fumbling, wobbly starts . . . slant-driven screws . . . or burred and broken screw heads. Spiral and power driving are made practical. In literally thousands of plants, replacement of slotted-head screws by Phillips Screws has increased screw driving speed up to 50% . . . and has entirely eliminated rejections due to driver gouges.

Compare the costs of driving Phillips and slotted head screws. You'll find that it actually costs less to make fastenings with Phillips Recessed Head Screws!

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The Phillips Recessed Head was scientifically engineered to afford:

Fast Starting—Driver point automatically centers in the recess . . . fits snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.

Faster Driving—Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)

Better Driving—Turning power is fully utilized by automatic centering of driver in screw head. Workers maintain speed without tiring.

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tool operation, and gas and electric welding. Much of the training time is spent in shops providing a diversity of machine maintenance experience.

With the greater variety of scout cars and light and medium tanks, men with some supervisory experience, such as shop foremen in garages or auto factories, are needed as automobile mechanics.

In three months these men learn the technique of army care of tanks. While learning to drive and repair this mobile equipment, the men complete assigned lessons in manufacturers' manuals and technical films, and study technical texts on internal combustion and diesel engines.

That's how the personnel of Rock Island Arsenal is handling training in today's production battle. It affords an example that may guide other industrialists who are busy now on war contracts but who this winter will

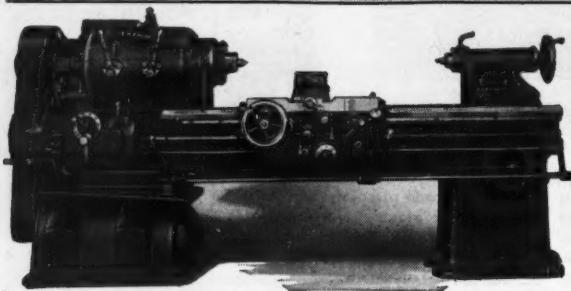
have to produce more with "green hands," many of whom have had little or no experience in operating machine tools.

Allegheny Ludlum Creates Carbide Division

W. F. Detwiler, Chairman of the Board of the Allegheny Ludlum Steel Corporation, Brackenridge, Pa., has announced his company's recent acquisition of the Carbide Alloy Corporation of New York City. The property will henceforth be operated as Allegheny Ludlum's Carbide Division.

Initial products of the company's new manufacturing division will be a line of highly developed cemented carbides, produced under processes established by Carbide Alloy Corporation. Later activities of the division will probably take into account developments which have long been under study in Allegheny Ludlum's Research Laboratories.

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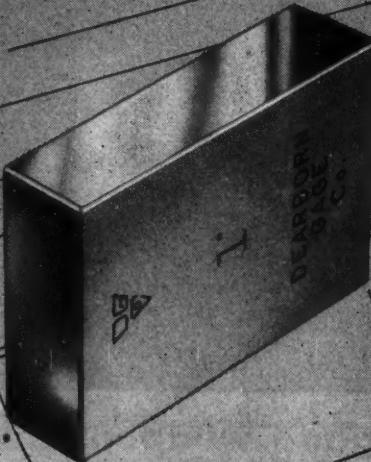
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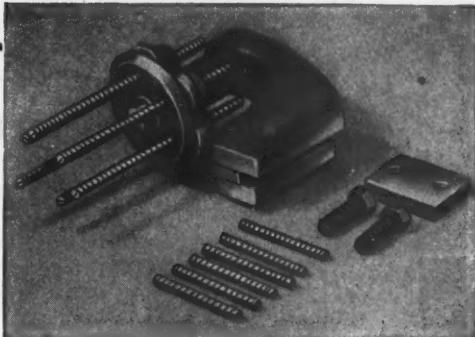
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MULTIPLE CARRIAGE STOP

SETS 6 STOPS FOR
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MODEL CS-1 FITS ATLAS, LOGAN,
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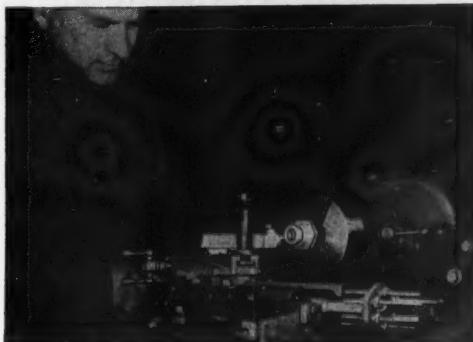
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- ACCURATELY GAUGES LENGTH OF CUTS
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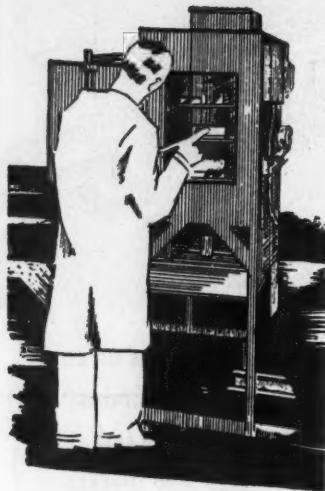
All necessary parts are supplied with
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There Is No Substitute for Good Heat Treatment

But, as the author explains in this article, good heat treatment is useless without good design

By A. S. EVES

Chief Field Engineer, Perfection Tool & Metal Heat Treating Company

THREE is no substitute for a good job of heat treating. Of what use is the most expensive cutter or die, for example, unless it is properly hardened?

Surprisingly few persons, it seems, understand clearly that the outcome of heat treatment is far from being wholly dependent upon the furnaces and equipment used and the skill of the operator. Especially among firms, a lack of discernment is apparent which has often led to chronic indifference. In many cases the designer or owner of the tool fails to realize the extent to which he may be responsible for the successful heat treatment of that tool, or the extent to which improvement could be made in the tool or product, or both, if certain rules of design or manufacture were observed.

If, instead of leaving the responsi-

bility for successful heat treatment on the shoulders of the heat treater, the customer would mentally trace the course of the tool backward through the shop and drafting room to the front office, in many cases instances would be found where forethought would help the heat treater to do a better job. Such consideration would not only pay dividends, but would comprise a really worthwhile contribution toward the saving of man-hours and critical materials.

For one thing, he would discover some seeming trifles which actually are quite important. Is it well known, for example, that the prick of a punch sets up strains in steel which, even though the mark be machined away, may later cause the tool to crack in hardening or fail in service? Is it common knowledge that steel can be machined in such manner that it will

be foredoomed to remain soft even when properly heated and quenched? Or to warp all out of shape?

The fact is that a tool can be designed so badly that the hardener won't have a chance in the world to survive the treatment specified in the order. Often a single glance by a trained hardener is enough to tell that the treatment specified is impossible. Again, the hopeless condition may exist but there may be no evidence of it at the time he starts work.

True, a heat treater can go hay-wire all by himself, but he cannot consistently turn out grade A work unless all those before him who have had anything to do with the job were on their toes too. Now, more than ever before, it is up to every one of us to produce tools and mechanical parts that stand up to the rigors of war, and to get the last ounce of production out of every tool. There no

longer is any room for those chaps who think that a piece of steel is hardened all right if it is merely shoved into a nearby stove and then ducked in a pail of cold water.

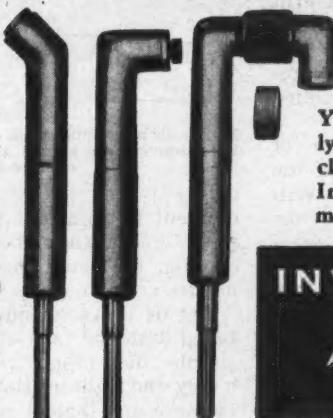
A colleague of mine stood amazed one day since Pearl Harbor, as he watched one of these fellows push hundreds of chisels at room temperature directly into a hot furnace, douse them and send them out to work without any kind of a draw. Surely there is but one word which describes that sort of thing—and that word is sabotage.

Indeed, I sometimes wonder if the time has not arrived when we ought to give a gentle nudge to firms who boast, blandly and innocently, "Oh, we have a furnace of our own, and we get along just fine." Wonder what they might say if asked, "Since you find you can do most any hardening job with just one furnace (or maybe two), just why do you suppose pro-

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fessional heat treating establishments find it necessary to start those same kinds of jobs in a preheating furnace, perhaps transfer them into another, then into the hardening heat, and finally use still more furnaces to give these tools or parts one or more draws—using three, four, or even five furnaces—to say nothing about auxiliary

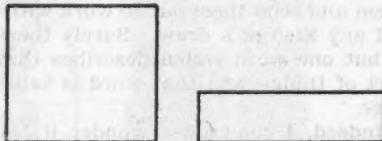


Fig. 1—Assuming that these drawings represent two pieces of steel, the smaller one will heat and cool faster than the larger one, and also will be harder.

controls and testing machines?"

I am not at all certain that what satisfies these folks is good enough to satisfy everyone who has interest in the excess tonnage of tool steel consumed, or the additional manhours spent in tool replacement. Should they be asked to stop and think a bit—or shall we just leave them to their own devices?

One thing is sure; no matter how competent a heat treater such a firm employs, he can not do good work with poor or insufficient tools. To the extent that he lacks the accoutrements of his trade, he is compelled merely to tinker.

Fortunately, a goodly number of manufacturers already have seen the light. They own and operate well-equipped heat treating departments. They hire the best men they can get—perhaps even add a laboratory and a metallurgist. Others have decided that this is not economical for them, so they send their work out. Still, in neither case is a hardener able to achieve best results unless he has the cooperation of everyone involved, all the way down the line!

Only too often any possibility of do-

ing a first-class job is wiped out before the work gets to the hardener. He often is placed on the spot through no fault of his own, because someone thoughtlessly created a condition which he is powerless to remedy. A few very simple illustrations will make some of these things quite clear.

Suppose that in the rush and bustle of today a designer fails to give full consideration to the fact, when he lays out a job, that it must be subjected to a high heat—perhaps 1400, maybe 2400 degrees Fahr. Further, that it must be cooled from that high heat suddenly. He overlooks the relative rates of expansion and contraction between two pieces of steel—which are alike in everything *except size*.

In Fig. 1 are shown two pieces of identical steel. One piece contains only about one-fifth as much metal as the other. Any schoolboy knows that the smaller piece will heat through—and also will cool—many times faster than the larger. Also that the smaller piece will expand more rapidly while being heated, and contract much faster when cooling.

Incidentally, may I digress for the

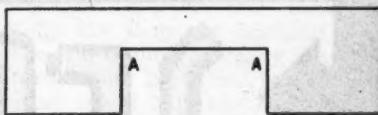


Fig. 2—In hardening a die of the design shown here, tremendous strains will be set up at the corners A.

moment to point out that the smaller piece will always, because of faster cooling, be found also to be a little harder.

Let us proceed and imagine we are faced with the task of heat treating a simple die (Fig. 2) wherein both heavy and light sections are combined. Is there any logical reason to suppose that the natural law of expansion and contraction has been altered in the

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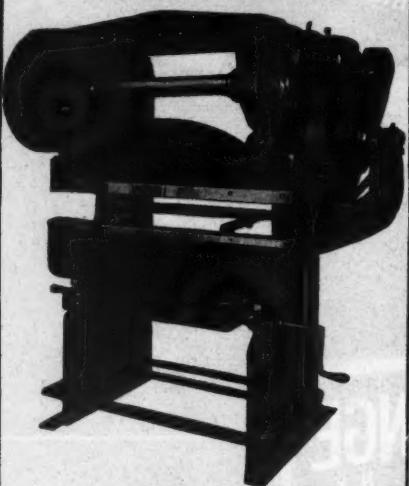
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least, merely because these pieces now are joined together?

Not at all. In fact, the rapid movement of the lighter portion—its perfectly obvious effort to pull away from the heavier parts—sets up tremendous strains at the two sharp corners marked "A." These strains are piled on top of others which accrue from the shock of quenching the hot steel. If these strains total up to more than 100 per cent of the tensile strength of the steel, there is bound to be fracture. Yet when this happens, the attitude frequently is "Blame the hard-

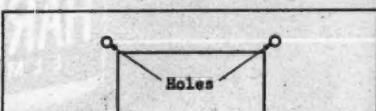
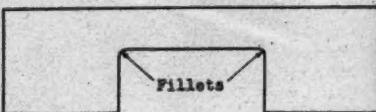


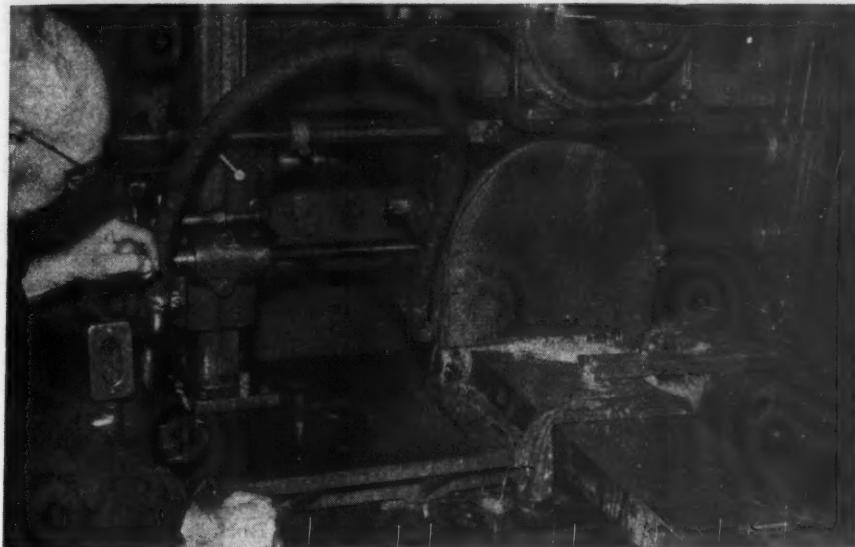
Fig. 3—Corner strains can be minimized by using fillets, or by drilling holes at strategic points as shown here.

ener. It was one piece when we gave it to him."

There really is very little that a heat treater can do about it except, of course, to preheat carefully, transferring it from a furnace at very low heat, into another at a higher heat, and so on. But he would do that anyway, sharp corners or not. He might wrap some wire around those corners, to absorb heat; then the die might not break, but would be softer. Altogether, the outcome is far too dependent upon Lady Luck, or favorable answer to a fervent prayer.

Made from a water hardening steel, this job would be more hazardous than if oil hardening steel had been chosen, if for no other reason than that cooling would be slower and





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movement would be diminished.

How much more certain of success we would be if the designer could provide for a fillet in each of those two dangerous corners, or if that were impossible, arrange for a small hole opposite each corner which would catch and stop any creeping of the cracks beyond those holes. See Fig. 3.

Did you ever read the recommendations of the Responsibility Committee of the Metal Treating Institute? The preamble goes something like this:

"It is generally recognized that despite the use of every care, ample equipment, and modern scientific methods, there still remain hazards in heat treating."

That organization comprises many of the finest professional steel treating firms in America. And I would bet my last dollar that when that preamble was written they had in mind the many times they were faced with conditions that are troublesome, and

which could have been avoided, but which were beyond their control.

At our own plant many jobs come in which we refuse to treat except at customers' risk. Those are the ones which we can see with half an eye are going to be troublesome. Others may be just as hazardous but the true conditions are not apparent until too late.

Of the many things that tend to set up strains in steel, a few are unavoidable. Hobbing and cold heading are typical of these. Others, such as forging below correct temperatures, and use of marking stamps which are too sharp, have the same deleterious effect and are really inexcusable.

Fig. 4 illustrates the story of a dozen tools we received from a munitions manufacturer. They were made from water hardening tool steel; hardness to be 60 Rockwell C scale. These tools were machined from a round bar, about 3 inches in diameter, and when finished about 98 per cent of the



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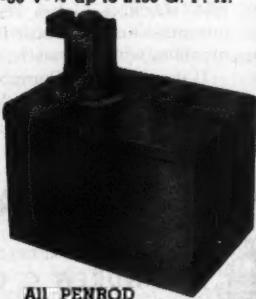
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tool was a solid cylinder. The upper end had been machined out, leaving a very thin flange around the top. There was no fillet at the juncture of the heavy and light sections; in fact, if anything, there was a slight undercut. Of course we could see at a glance that if such a tool were heated and quenched in water (in oil it would not become hard enough), the flange naturally would shrink right off in the form of a ring.

This job was refused. And I am quite sure that none of these particular tools played any part in helping to slap down the Japs.

Hundreds more examples could eas-

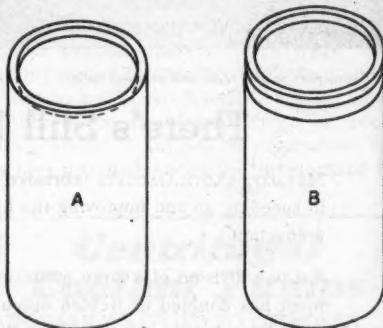


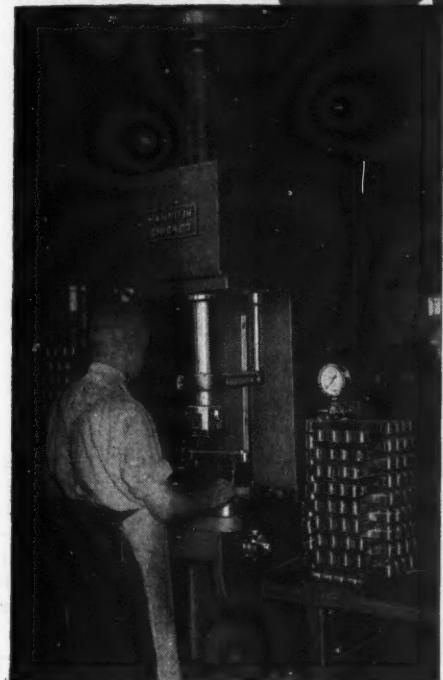
Fig. 4—Tool bored to leave a flange around the top as at A. Any attempt to harden this piece would have resulted in cracking off the flange, as at B.

ily be presented, where sharp corners or abrupt shoulders could be strengthened (at least four or five times) both for hardening and for service by merely using fillets. This would be true regardless of the type of steel. Two common cases are shown; in Fig. 5 a high speed form tool; in Fig. 6 a punch.

A die like the one shown in Fig. 7 really ought to be made in two sections. Indeed, if it were a very large die, say 4 ft. x 6 ft., it assuredly would be. But my point is that the same rates of expansion and contraction,

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relatively one to the other, apply regardless of the size of the die.

It sometimes is possible to compensate for heavy and light sections by deliberately cutting away part of the heavy section to create better balance, as in Fig. 8.

It is well to remember that whenever one man produces the tools and parts and another must heat treat them, the latter should always be

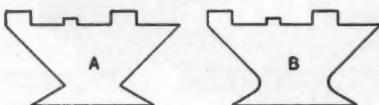
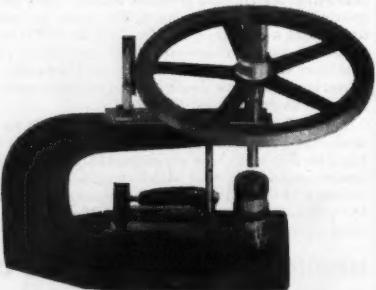


Fig. 5—The piece A is poorly designed, because the sharp corners will induce cracks in hardening. By substituting fillets, as at B, the chances of hardening successfully will be multiplied.

given full and correct information as to the kind of steel (so he may know what heats to use) and the use to

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Fig. 6—Punches made with square shoulders, as shown at A, will probably break in hardening. The shoulder should be tapered, as at B.

which the articles will be put (so he may judge how hard to leave them). Every year, thousands of manhours and tons of scarce steels are wasted

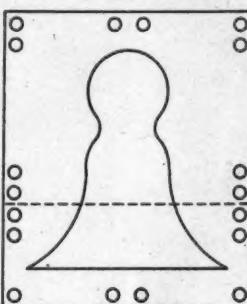


Fig. 7—If a die must be made to this design, it should be made in two sections so that hardening strains can be equalized.

because steels are mixed, or wrong instructions and indications are given.

Next in line among the things which make professional hardeners prematurely gray is failure of the customer to remove at least $1/16$ inch from all surfaces of any piece of steel which is

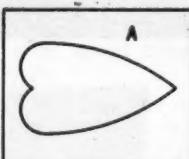


Fig. 8—The drawing A illustrates another poor design. Holes drilled as shown at B will equalize hardening strains.

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to be heat treated. This is fairly general practice, but it is still a prolific source of trouble and waste.

All steels have a soft decarburized

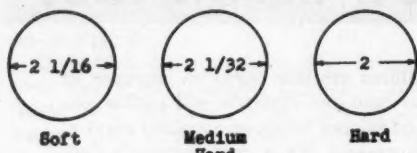


Fig. 9.—These pieces, all cut from the same bar of 2 1/2-inch steel, varied in hardness on the peripheries.

surface when they come from the mill. This is oxide of iron, produced by rolling, and will not harden. If it is not removed, it acts as a sort of insulator between the heart of the steel and the quenching medium. The result is a soft surface. Underneath, the steel may be hard, but not quite as good a job as it otherwise would be.

A customer one day phoned his steel supplier, saying that the round bar of steel he received was no good—it refused to harden uniformly. He had made three parts from it and treated them precisely alike. One proved too soft to be of any use, another was slightly better, while the third checked O. K. See Fig. 9.

The steel company's trouble-shooter dug up the invoice, and found that the bar was originally only 2 1/2 inch in diameter. Then he simply stood each part on end and took Rockwell readings where each piece had been sawed. They all read alike, and were quite hard. On grinding the peripheries of the two softer parts down to 2 inch diameter, acceptable readings again were obtained. The customer thanked the steel man, apologized for making a fuss, and explained that in 30 years' experience he had never encountered this principle. Thereafter, he purchased slightly larger stock and ex-

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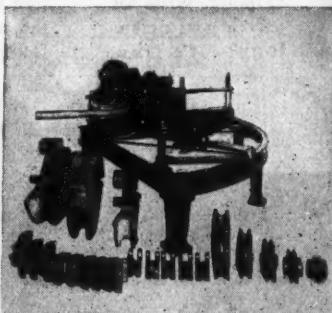
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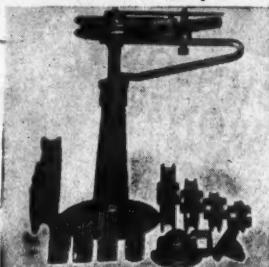
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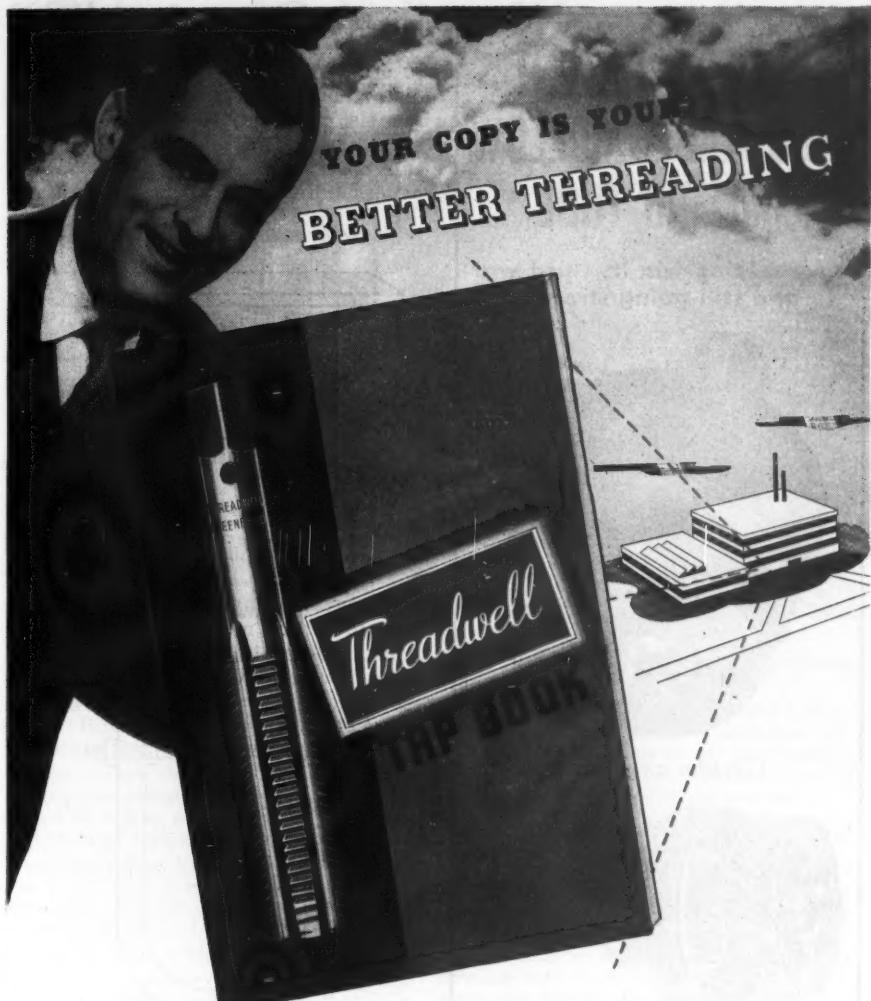
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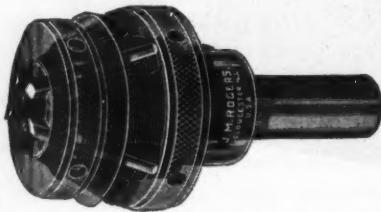
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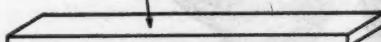
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perienced no further trouble.

This decarburized surface gives rise to other problems. For one, extreme distortion takes place if this soft surface is not removed uniformly from all sides. Let us take, for example, a thin blade. True, such items are more or less subject to warping from hard-

1/16" Removed From This Surface



Before Hardening



When Quenched

Fig. 10—Machining one surface of a piece of steel will give the quench an opportunity to shrink that side faster than the other, resulting in distortion.

ening strains anyway, but the one in Fig. 10 will do nicely to illustrate our point. Before hardening, it is flat. Now if we remove 1/16 inch from the

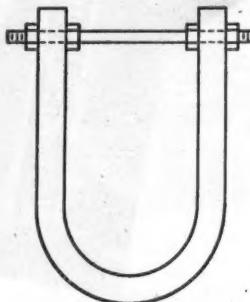


Fig. 11—A "spacer" can be used to hold the ends of a piece so that they will be properly spaced when quenched.

top surface only, the quench will attack that side more readily than the opposite side, with the natural effect of shrinking one side faster than the other.

The same thing often gives rise to

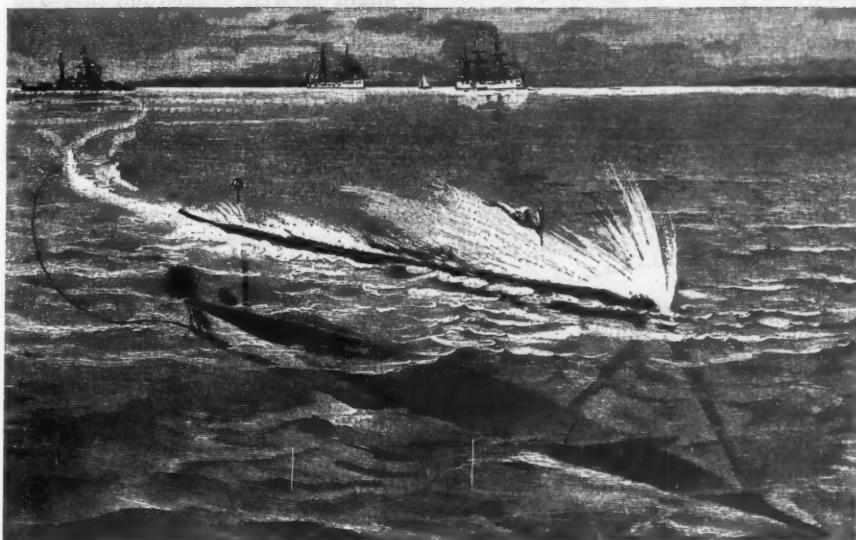
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When you consider what an intricate mechanism the torpedo is—and that it is only one item on today's list of war weapons—can you but marvel at America's war output?

That output is a miracle of mass production that was made possible, in part, when, over fifty years ago, the first man-made

abrasive was created and the grinding wheel became a production tool.

Since then, engineers have learned how to grind mechanical parts to split-hair accuracy. This accuracy led to interchangeability of parts. And interchangeability, in turn, made mass production possible.

Today you can't put your finger on a single weapon that flies, sails, rolls, shoots or explodes that isn't in some way touched by grinding. Knowing that "this is a grinding war," we at Carborundum are acutely conscious of our responsibility to war industry. And we are constantly striving to develop new ways in which grinding can serve you better to help win the war.

But we are also mindful that grinding plays a part in the production of nearly every article built for peace and that today's grinding developments will have a wider application than ever after Victory.

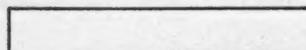


THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

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complaints about soft spots or unequal hardness in dies and similar tools and parts. Many such claims are rejected promptly when a reading taken on a sawed cross-section, or



Before Hardening



After Hardening

Fig. 12—Another example of uneven section. The thin edge will cool and shrink faster than the thicker section.

some portion which has been deeply machined, shows the hardening to have been correctly done.

Unfortunately, no satisfactory way has yet been devised to replace the

carbon in such decarburized surfaces.

While on the subject of distortion, it might be well to mention that if a designer will look ahead, he often can arrange for artificial means for making odd shapes "stay put." Fig. 11 shows only one of many. In this case a piece which is apt to change dimension at the open end has been provided with a spacer. Some jobs will require an elaborate jig, in which several pieces can be quenched or drawn simultaneously. Such jigs are usually made from mild steel, and thus can be used over and over again.

Long, beveled tools, like the one in Fig. 12, always present something of a problem. Aside from normal warpage due to their length, here again we have that bugaboo of heavy-and-light section. The thin edge will cool so much faster than the thicker part that it will be pulled out of shape, and it also has to absorb a lot more heat than it needs. Chances

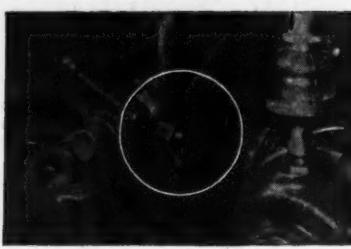
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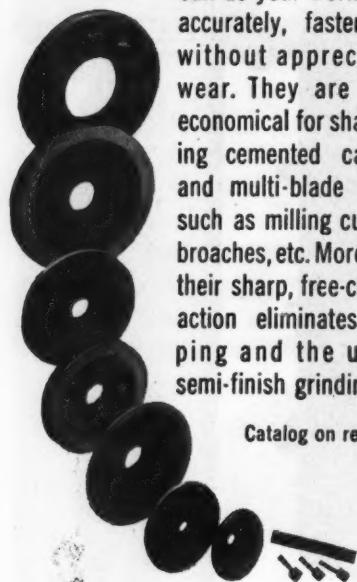


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can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-blade tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding.

Catalog on request.



are, also, that tiny vertical cracks will occur all along the thin edge.

Such edges should be left thicker, and ground afterward. Or, if there is a quantity of blades to treat, perhaps they can be stacked as shown in Fig. 13, and thus be more like a solid bar.

Winding up this topic of uneven sections, consider the great variety

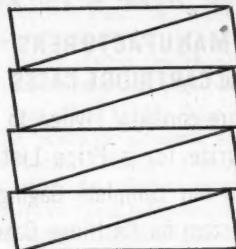


Fig. 13—If there are enough of the pieces shown in Fig. 12, they can be piled like this for hardening and thus reduce the strain casualties.

of high speed cutting tools which arrive at the hardening room machined to within a few thousandths of finished size. Now, some high speed steels decarburize in treating more deeply than do other types. Allowance should not be made for that. Also,



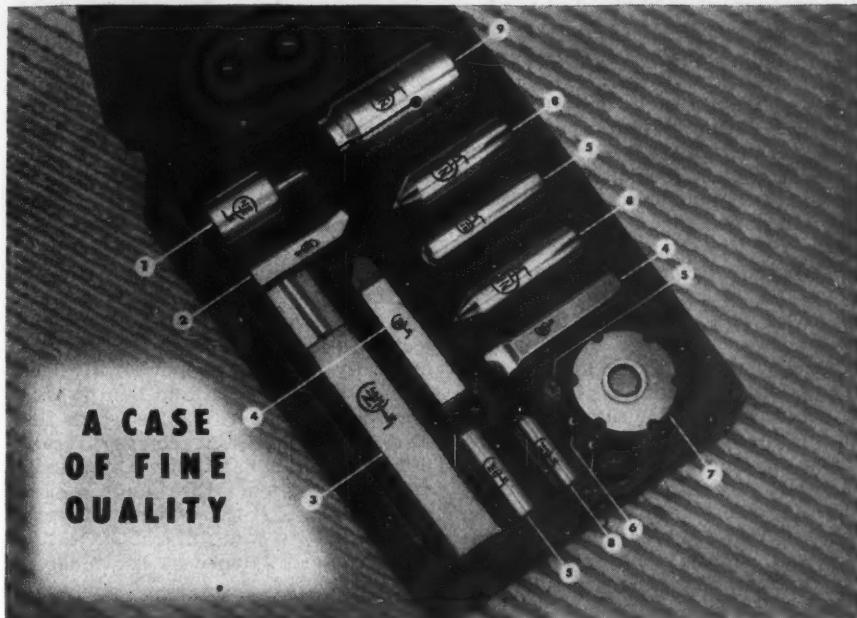
Fig. 14—Hardening a step reamer such as this is a difficult task. Leaving a little extra stock to be removed in finishing will help some.

there is another factor to be reckoned with.

Consider a step reamer, for instance, like that shown in Fig. 14. Here we find several different thicknesses of steel. In order to do a proper job, the heaviest working section must be heated clear through to the middle. While that is being accomplished, it is plain to see that the

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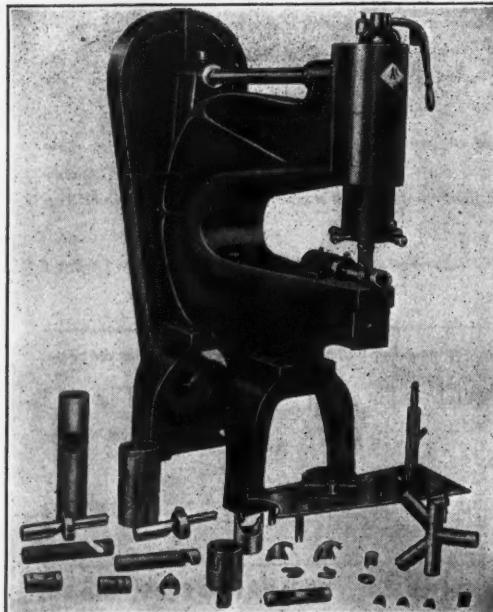
lighter sections — particularly the cutting edges—are cooking plenty, at extremely high heat! It takes a mighty good man to bring hundreds of such tools through, one after another, all perfectly hardened. Don't you think it would be well to take on just a little more grinding, and leave a trifle of "land" on those edges so they will not melt and run?

It is well to note also that preventable difficulties in hardening are not by any means confined to tool steels or alloys that can be heat treated. One of the commonest trouble spots appears when we take a look at certain carburizing jobs.

As a starter, let me say that a professional heat treater dislikes to case harden any steel which contains more than about 0.25 carbon. The lower the carbon, the better the case. When the carbon is increased, carburizing heats may well be too much for the steel to withstand. Bear that in mind. And

never, never be guilty of expecting high hardness from steels which are not safe to carburize, yet which have not enough carbon (or assisting-alloys) to reach the specified reading. In short, don't leave the hardener in the middle. He should not be called upon to decide whether to take a chance or recommend that you scrap the job and start over with a different steel.

Our next point deal not with analyses, but *optics*. Psychologists tell us that when we have before us any object with large and small sections, we naturally are more powerfully attracted to the larger, and tend to disregard the smaller. Not so with the heat treater when it comes to carburizing. For he knows from long and sad experience that while a case will resist wear, there is no strength in it. It is, in fact, almost as brittle as chinaware. Hence he has made a rule as follows:



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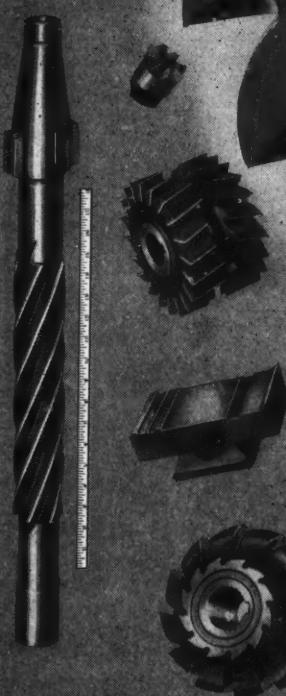
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For strength, always leave at least twice as much *core* as there is *case*. And don't forget to double the case dimension if it is to be on two sides.

A simple sketch will make that clear. Fig. 15 shows a 4-inch cube. Obviously it will stand far more case than would be possible by any known method to give it. The usual case depth runs about $1/32$ inch to $1/16$ inch, sometimes deeper; but for simplicity we'll say the order calls for $1/16$ inch case.

Now suppose we add to this cube a

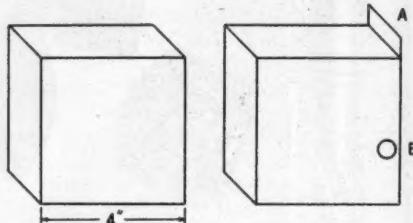
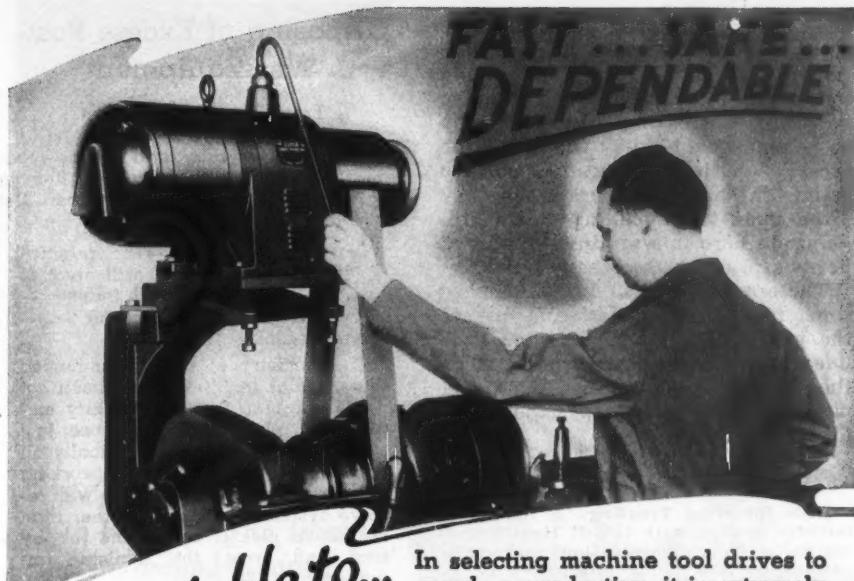


Fig. 15—Hardening the square block shown at the left is comparatively simple; hardening the same block with thin sections as shown at A and B is almost impossible to do successfully.

flange or an ear, perhaps $\frac{1}{8}$ inch thick, somewhat as pictured on the right at A. You can see that a $1/16$ -inch case, penetrating from both sides, would go clear through and leave no core at all. The slightest shock would cause that flange to break off. The same kind of hazard would exist if we drilled a hole close to the outer edge of the cube, as at B. If you were a conscientious heat treater, and the customer still insisted on a $1/16$ -inch case, what would *you* do?

There are, fortunately, ways of selective hardening such jobs which enable us to meet some of these conditions, but not all. Space simply does not permit of their being discussed here.

Neither have we room to touch on



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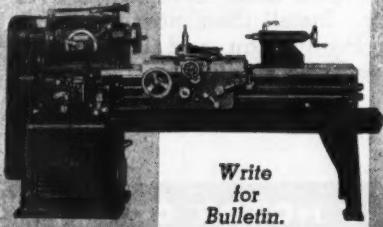


the importance that selecting the right steel plays in the final results. Suppose we just drop a suggestion in the ears of all who earnestly desire better heat treating—and especially those who would gladly wipe from the faces of Hitler, Hirohito & Co. the smile that must be there when they dwell upon the appalling waste still going on here in war time—that two heads still are better than one.

There are still lots of ways to save time, money, and grief; and one of the greatest opportunities along this line lies in closer cooperation between the fellow who produces tools and parts and the fellow whose job it is to harden them.

Salts for Heat Treating. A four-page bulletin dealing with G-S-R Heat-Treating Salts—their classifications and applications—is now being offered by G. S. Rogers & Co., 228 N. La Salle St., Chicago 1, Ill. Copy free upon request.

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Disposing of Excess Post-War Equipment

From BENJAMIN J. STERN

It certainly pays to read the newspapers. For instance, I noticed an item in the New York Times of September 21st to the following effect:

London, Sept. 20th.—The practice of "learn as you work" will have to take a back seat in British industry—at least for the duration of the war—it was disclosed today.

The Ministry of Labor announced that special facilities have been set up for training workers already employed in factories and those just starting factory work. Practically all new employees, even those working at relatively unskilled jobs, will receive systematic training rather than be left to pick it up on the job by trial and error, the ministry announced . . . "

It seems rather odd to have at this late date so conclusive a confirmation of a theory which instructors in vocational schools regard as axiomatic. But better late than never. Our public vocational schools were organized long ago on the premise that skills can only be taught by well-planned systematic training, following procedures dictated by a close study of and experience with human psychology.

I believe that these public vocational schools have demonstrated conclusively that they have a vital, decisive role in the job of training our youth to take their places in American industry. These

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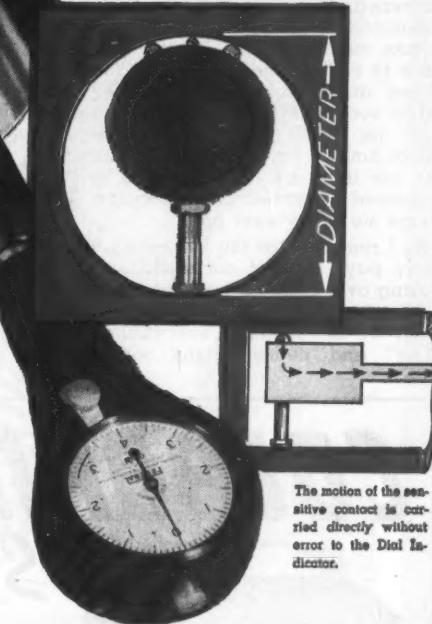
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schools have supplied thousands of basically trained mechanics and technicians to the furtherance of our war time production goal. Furthermore, this army of production soldiers has had a training in American citizenship which supplies them with the incentive for the struggle. They know what they are fighting for.

Nor is this all. When the call for production miracles went forth there arose at once a corresponding demand, first for the experts to design and tool up for this production, and then for the specialists to turn out the work. It was a natural thing to turn to the already existing facilities and faculties provided by our public vocational schools and to organize them for adult training after regular school hours. I need not detail here the fine job done by these training centres sponsored by government agencies. This brings me to my next point.

As I remarked at the beginning, it certainly pays to read our periodicals. In looking over a recent issue of a technical publication, I noted the statement that when we have finally overwhelmed the "Axis" and peace reigns once more,

there will be over 400,000 machine tools, built for war purposes, which will have to be redistributed for conversion for peace-time use. This seems to me a golden opportunity to remove one of the greatest handicaps in our public vocational schools; namely, the lack of adequate modern machines for training its student body. Machine tools are expensive and the average school board, once it has installed the equipment in the vocational schools, is disinclined to spend the money necessary to modernize this equipment every few years.

How about arranging for re-equipping our vocational schools with some of the surplus machinery and tools which will burden our economy once peace is declared? Our machine tool industry could then be relieved of some of this burden of existing inventories and go ahead to re-equip industry for peace-time production. Our students will have adequate modern machinery to work on and industry in general will benefit.

Let our schools have production machinery such as turret lathes, screw machines, punch presses, and other ma-

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chines, the lack of which heretofore has handicapped them in their program of training. From what we can tell of the future our public schools are going to continue to train our young for industry, but almost certainly they are going to become centres for adult retraining and rehabilitation.

Grand Specialties Occupies New Plant

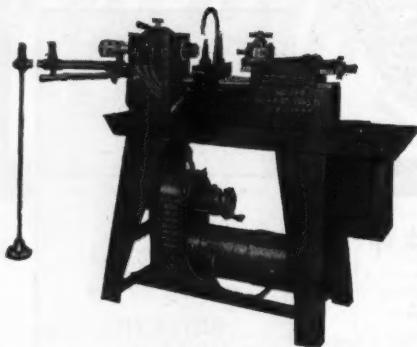
A. M. Sasgen, Vice-President and General Manager of Grand Specialties Co., of Chicago, Illinois, pioneer manufacturers and distributors of Quikset, Dual-Grip, Quick Lockset and other modern time and labor saving clamps, announces the completion and opening of its new manufacturing plant at Grand and Troy Avenues in that city. The company was recently awarded the coveted Army Ordnance Banner of Merit and the presentation ceremonies were held in connection with dedication of the new plant.

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To meet the demand for their line of diamond pointed and tungsten carbide tools for all industrial purposes, E. Karelson, Inc. have just moved into their large modern plant at 125 West 45th St., New York City. The new plant has been equipped with the latest scientific precision machinery for the rapid but accurate production of Diamond Pointed Trueing and Cutting Tools. It will give the company more than six times its former capacity.

G-E Electronic Heaters for heating metals are featured in an eight-page illustrated bulletin issued by the General Electric Co., Schenectady, N. Y. The bulletin describes the electronic method of heating metals, emphasizes its simplicity, and presents in detail the specifications of both 5-kw. and 15-kw., 550-kilocycle electronic heaters. Also included in the bulletin are illustrations of many important small parts which may be brazed, soldered, or surface hardened by electronic heating. Copy of Bulletin GEA-4076 free upon request.

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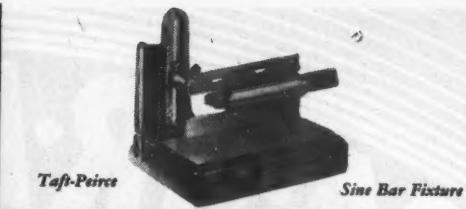
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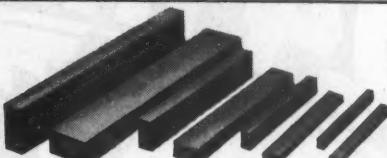
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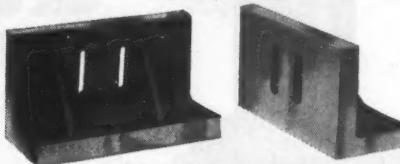
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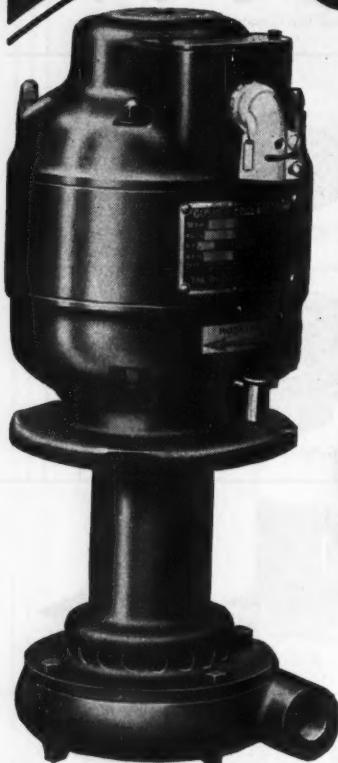


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Fig. 1—Dynamiter Loads Dynamite into Oil Hole in Large Diesel Engine Crankshaft Preparatory to Blowing Out Broken Drill. At Right, Nels Sorenson, Originator of Method

A Simple, Effective Means of Removing Broken Drills from Crankshafts

By SEWARD A. COVERT
The Ohio Crankshaft Company

Dynamite As A Machine Shop Tool

ACASUAL conversation between a golfer hunting a lost ball and a farmer blowing out stumps has resulted in the development of a machine shop operation in which dynamite is used as a tool. The operation is used to remove broken drills from the oil holes of hundreds of precision-made crankshafts. The method can

also be used to remove broken reamers or plug gages, and is saving many thousands of dollars annually. It is especially suited for clearing deep drilled holes.

Today, in the plants of The Ohio Crankshaft Company, Cleveland, leading independent producer of automotive, aviation and Diesel crankshafts,

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January

skillful use of this high explosive has eliminated the scrapping of a shaft because of a broken drill. Unconventional from an engineering standard, it has proved itself highly effective.

Originator of the dynamiting method is Nels Sorenson, Superintendent of the automotive crankshaft division of the company. Seeking a certain



Fig. 2—Dynamiter Ignites Fuse After Tamping Dynamite into Hole and Inserting Cap. Less Than Thimbleful of Explosive is Used

and less costly way to counteract the curse of crankshafts—broken drills in oil holes—the sight of the farmer tamping dynamite into a stump gave Mr. Sorenson an idea. Could the same thing be done to remove drills? Tests made in a coal bin proved that it could.

That was ten years ago. Mr. Sorenson has perfected his technique and

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Fig. 3—As Fuse is Lit, a 4 x 4-Inch Timber is Placed Over the Hole to Check the Drill When It is Blown Free

taught others to do the work so that now by actual count he has lost only two shafts from which the drills could

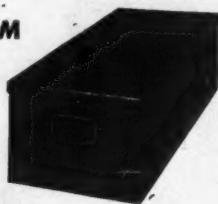
not be blown out. Thousands of shafts have been withdrawn from salvage and returned to the production line because of the Sorenson method of salvaging.

Significant is the lack of costly equipment necessary to accomplish the dynamiting, and the clean cut results following the blowing. Needed are only a clearing in which the salvage work can be carried out, common dynamite, fuse, caps, wire probe, putty and a brace and bit. So simple is the procedure that automotive engineers have not believed the dynamiting possible.

At Ohio Crankshaft educational efforts have been put forth to help reduce drill breakage. Some progress has been made but as in all shops drills are broken either because the operator feeds the drill improperly or forces it so that chips cannot back out. The salvage department would be cluttered were it not for the use of

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the dynamiting operation, which enables a quick return of the shaft to production. The procedure can be applied to any fixture, die or part wherein drills, plug gages or reamers may break.

In the experience of Tocco, the



Fig. 4—Mr. Sorenson Points to Broken Drill, Which has Split the Timber and Imbedded Itself in the Wood

monthly breakage of drills varies and the value of the crankshafts saved does likewise. Savings are computed on the style of crankshaft more than on the quantity from which drills have been removed. Recently 93 shafts were blown free in one month. Their value was more than \$42,000. In another month some 133 shafts valued

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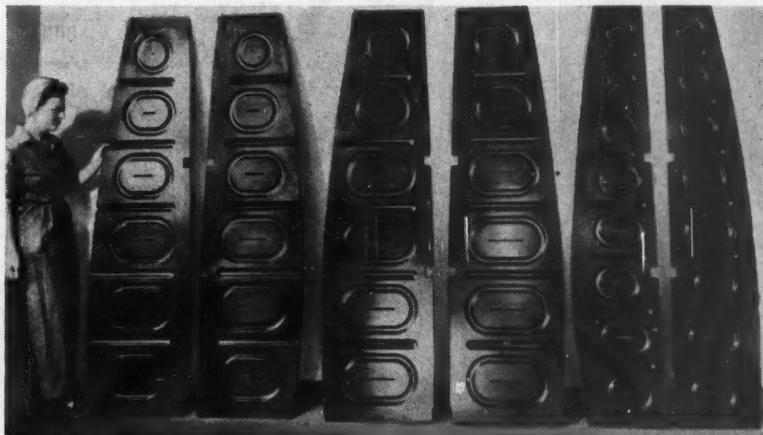
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These six-foot wing rib dies, used in a hydro press, are made of Masonite Die Stock. Photograph courtesy of Schleenzig Manufacturing Company, Camden, N.J.

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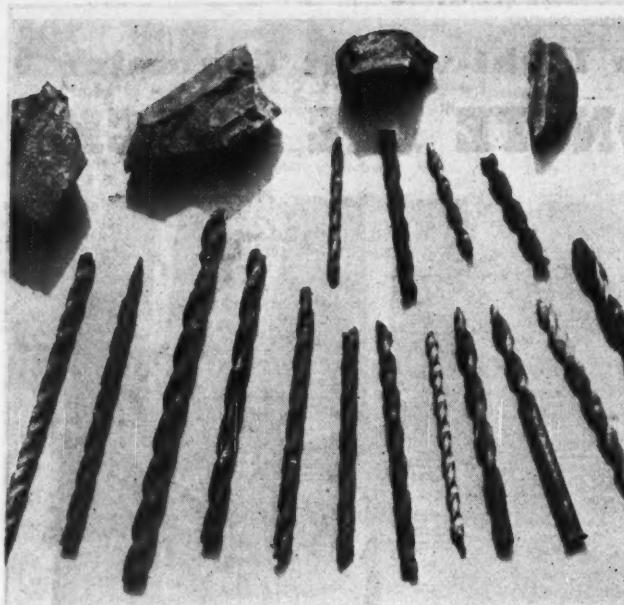


Fig. 5—Broken Drills Picked Up from around the Blasting Area. The Large Pieces are Sections of a Core Drill Bit That Was Blown Out by Using Several Shots

steel skid or the ground. With a wire rod, the hole is probed to determine the position of the drill below the bearing surface.

Dynamite is taken from a standard stick of blasting powder and pushed from a small trough into the hole by

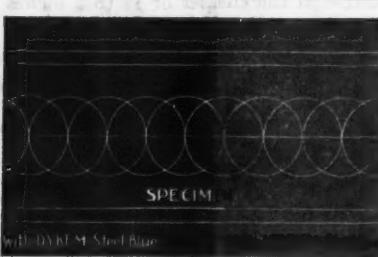
at only \$29,000 were treated. In comparison to the value of total production the number of crankshafts salvaged is not large, but the savings resulting from this homespun procedure are.

Technique of Dynamiting

Technical terms cannot describe Mr. Sorenson's dynamiting technique. It is simplicity itself. The shaft in question is removed to a clearing outside the plant and placed on a platform,

means of a round stick, as shown in Fig. 1. No more than a thimbleful of dynamite is ever used, and generally the amount is considerably less, depending upon the size of the hole and the set of the drill. Practice has shown the proper quantity of powder to use for certain conditions, and in teaching his salvage blowers, Mr. Sorenson stresses "put in less powder rather than too much."

A six-inch fuse is next inserted into a small diameter, shoulder-free cap



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THE BULLARD COMPANY
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and dropped into the oil hole atop the charge as illustrated in Fig. 2. When ignited, a heavy plank or metal shield should be placed over the bearing surface to check the flight of the drill member as it is blown free, as shown in Fig. 3. Frequently timbers are split or the drill penetrates metal guard sheets. It is wise to keep at a safe distance during the dynamiting.

Drills are freed by the pressure of the blast, which follows the drill flutes to the bottom of the hole and there reverses itself to drive the piece back out. As it leaves the shaft, the drill makes a ringing noise of metal striking metal.

No Damage to Metal

Wonder has been expressed relative to the effect of the explosion upon the metal. There is no evidence of harm, for thousands of crankshafts subjected to this operation have turned in long service records. The dynamiting

of the drill from a crankshaft or other steel object can be compared to the explosion of a cartridge in a gun barrel. No harm befalls the gun block. The same is true in appraising the blowing of the drills. The charge has no effect upon the high quality steel of the crank or camshaft.

Immediately upon "blasting," the piece is closely inspected, magnafluxed and returned to the line. Many times a broken drill has been reported, removed by dynamiting and the shaft put back into the line with no more than 45 minutes' delay. At Tocco, broken drills do not cause accumulation in the salvage department.

The drills that can be removed by this method vary in size from small 3/16-inch bits up to the 1 1/4-inch core drills used to drill lightening holes in camshafts. These big drills must be removed piece by piece, requiring more than one shot. The dynamite is tamped into the oil hole of the drill

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itself. Frequently, if a drill operator has himself endeavored to remove the drill, he forces the piece even tighter into the hole, thus necessitating more than one shot. In fact, Sorenson once blew 72 charges before a big drill in a large Diesel shaft came free. The value of the shaft was such that no amount of effort to free the oil hole was felt excessive. Once a drill breaks



Fig. 6—Putty Dam Built Up Around an Oil Hole in Which a Drill Has Broken Off Flush with Surface. The Cap and Fuse are Ready for Ignition.

off, Ohio Crankshaft drill operators are instructed not to attempt its removal.

To test results of dynamiting, the "blower" uses a common brace and bit. When the bit is inserted in the hole it reveals by difficulty in turning or by a clicking noise that the drill is still within. If it turns easily and backs out chips, the drill has been blown free.

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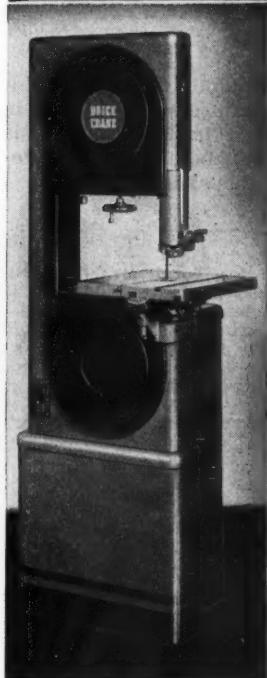
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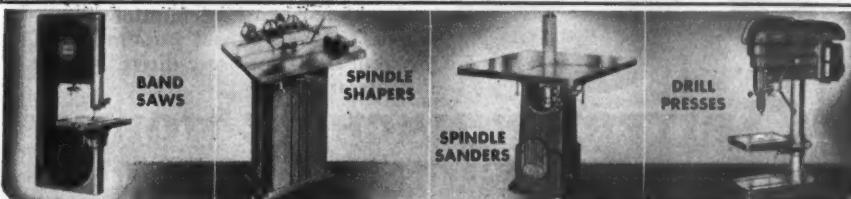
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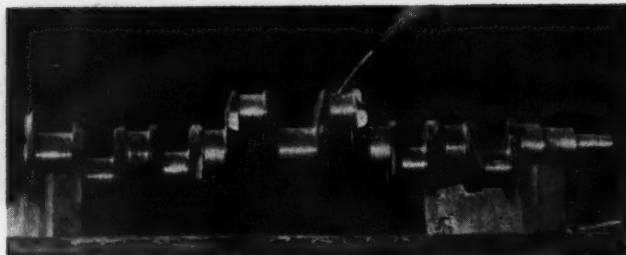


Fig. 7—Firing Second Shot on Shaft Shown in Fig. 6. First Explosion Blew Enough of Drill From Hole to Allow Second Charge to be Inserted Directly into Oil Hole

Occasionally a drill breaks off flush with the bearing surface. To blow this drill necessitates building a putty dam 1½ inches high above the hole. Into the dam is inserted a fuse and dynamite cap such as that shown in Fig. 6 which on detonating either blows out the drill or enough of it so that the next charge can be inserted directly into the oil hole and thus make it possible to finish the job.

Unconventional as is this explosive method, it has proved sound and has

recently been adopted by other automotive manufacturers—not only in this country but in England. It is saving hours of labor, tons of strategic metal and thousands of dollars.

"Instructions for Torch Brazing with Sili-Fos and Easy-Flo Silver Alloys" is the title of a sheet, available in bulletin form or chart form for mounting on the wall, which is now being offered free by Handy & Harman, 82 Fulton St., New York 7, New York.



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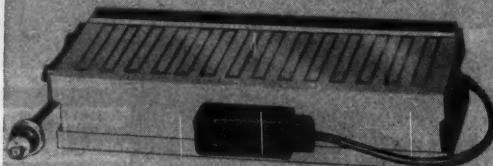
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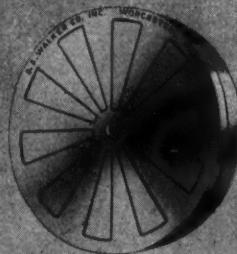


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By FRED M. BURT

"The Tokio Kid"

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This toothy individual is the "Tokio Kid" with a face you would love to smack—with brass knuckles. However, the T. K. helps to give Hirohito, Tojo, and other samurai idiots the heebie jeebies, with superior gnashings of honorable, prominent teeth. For the "Kid" is the 5th columnist who back-fired. He is a saboteur in reverse, for he was created for Americans, by Americans and his specific job is to point out to our industrial workers many of the ways that they may be unconsciously helping the nau-seant Nips.

Appearing first in the plants of Douglas Aircraft Company, and now extending his activities to thousands of vital factories throughout the na-

tion, the "Tokio Kid" is showing American Production Soldiers why and how they can save precious materials and time, and helping to keep ever before them at least a slight suggestion of the character of the implacable, inhuman foe with whom we have to deal.

In large full-color posters placed prominently along assembly lines, in the view of the workers on hundreds of machine tools, and in offices and along passageways, the Tokio Kid is omni-present. He points a bloody dagger at mixed-up piles of rivets or piles of scrap and leers significantly, "Much waste of materials makes so happy, thank you!" In another his head is caught in a huge mousetrap, and as his rising sun hat sails away his mouse body bounces up to tell a pointed story, for the title of the picture is "JAP TRAP" and the mouse trap is clearly labeled "MATERIAL CONSERVATION."

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

GEAR CUTTERS • UNGROUND GEAR AND SPLINE HOBS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

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MILLING CUTTERS • GROUND AND UNGROUND MULTIPLE THREAD MILLING CUTTERS

UNGROUND GEAR AND SPLINE HOBS

GEAR CUTTERS

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

BORG-WARNER

INTERNATIONAL HARVESTER
Allison JACK & HEINTZ

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CROSTEX

ELECTRO-MOTIVE

REMINGTON RAND

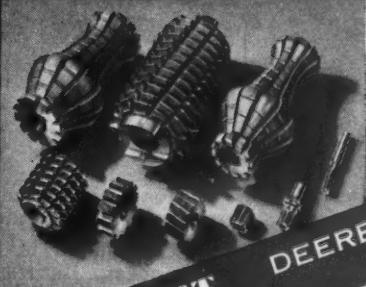
MUNCIE GEAR

AMERICAN CAN CO

KEARNEY & TREY

CURTISS-WRIGHT

REPEAT ORDERS FROM WORLD
FAMED MANUFACTURERS TESTIFY
TO THE DEPENDABILITY OF THE
MODERN LAKE SHORE PLANT AS
A SOURCE FOR YOUR SPECIAL RE-
QUIREMENTS IN ECCENTRIC FORM
RELIEVED MILLING CUTTERS AND
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SAVAGE ARMS

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CATERPILLAR TRACTOR

CRUGIBLE STEEL

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

Back of every Lake Shore
Tool are the facilities and
skilled personnel of one
of America's most com-
pletely equipped plants.

LAKE SHORE TOOL WORKS

Division of Carbide Tool Company

Send us your blue prints
for quotations on your
high speed tool, special
tool, and carbide produc-
tion tool requirements.

816 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS

January, 1944

MODERN MACHINE SHOP 213



A Broken Drill Slows Production and When 1,000 a Day are Broken in a Single Plant the Waste is Enormous. This Poster Shows How Pleased a Broken Drill Makes the "Tokio Kid"

cated" him to show production workers the why and wherefore of the vital material conservation program. Douglas employees, at first startled by the gargoyle and his pointed observations, soon looked upon him as their one and only favorite or favored Jap and heeded his backhanded words of wisdom. Although already working, the material conservation program showed additional and sharp improvement in the reduction of scrap and the decrease of waste and breakage.

Nationwide interest and comment has been aroused by the Tokio Kid and his name is known from coast to coast. But there are still many places where he is as yet unknown and where he should be adopted as a per-

This helpful little saboteur is the brainchild of Jack Campbell and Harry Bailey, Douglas artists who conceived the sly and wily character with the grinning countenance, and "edu-

"OUTWEARS
the best
Bronze Metal"

20 years ARGUTO without
a drink

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

Produc-
a Day
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FOR "IN PROCESS" GAGING...

ROLL THREAD SNAP GAGES

FOR
GAGING
AT THE
BENCH

FOR
GAGING
AT THE
MACHINE

Licensed Under Pratt & Whitney Patents

You want the gage that checks all principal causes of thread failure: errors in lead, pitch diameter, form, straightness, and out-of-roundness. That's what you get in the "Greenfield" No. 1625 Roll Thread Snap Gage.

Also you get speed, because of its open end construction. And long life—its rotating rolls reduce friction.

Note that when rolls, eccentric pins, and other parts do wear out, these parts as made by "Greenfield" can be used in the John-Son's type of gage made by any manufacturer.

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

DETROIT PLANT: 5850 Second Boulevard

WAREHOUSES in New York, Chicago and Los Angeles



Get Your Copy of this Booklet Today.

January, 1944

GET THE RIGHT STYLE FOR YOUR JOB

There are 2 general types of Roll Thread Snap Gages, and several different styles. Our descriptive booklet helps you choose the style best suited to your needs.





The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

ALMOND THREE JAW DRILL CHUCKS

are furnished in 9 sizes with capacities from 3/16" to 1". These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole.

Write for Complete



manent resident for the duration. In fact, his life should be exactly as long as that of Tojo, or until the marines sit down to breakfast in the Imperial Palace. For the Kid is available to all war industries and all rights for reproduction of these Douglas posters are available without reservation.

As a contribution to the War Production Drive and related programs



This Poster, Dramatizing the Waste Involved in Cutter Breakage, has Helped to Reduce Tool Casualties

for the conservation of materials, Douglas has reprinted thousands of full-color copies of different Tokio Kid posters and dispatched these to all the plants and organizations throughout the country which supply materials and equipments to Douglas assembly lines. Accompanying the posters was a letter from Industrial and Public Relations division conveying full rights to display the Tokio

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PLAN FOR TODAY AND TOMORROW

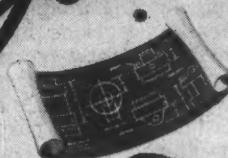
WITH T-J FOR

Tough Jobs!

Men responsible for efficient production in all types of industrial plants for a quarter century... have found T-J products "tops" for Tough Jobs!

Whether it's a job for Rivitors... hydraulic cylinders... air cylinders... cutters... Clinchers... or air controls... you can count on T-J for unbeatable efficiency, accuracy and dependable performance! All T-J products built to precise standards of manufacture... rigidly inspected... backed by practical-minded experienced engineering. In planning a better production set-up, for better products... specify T-J Quality! Write for bulletins.

The Tomkins-Johnson Co., Jackson, Mich.



HYDRAULIC CYLINDERS



AIRCRAFT
RIVITORS



DIE SINKING MILLING CUTTERS



AIR CYLINDERS



CLINCHORS



AIR CONTROLS

T-J

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

Kid, make additional copies, employ reproductions in house organs, or make any other use which would be beneficial in the production drive to victory.

But the Tokio Kid's renown does not stop there. His likeness and sage words have been published for the benefit of many readers. Paramount Newsreel sent its ace cameramen to Douglas and filmed the entire process used in turning out the unique posters. Letters and telegrams by the hundreds from war plants, technical schools, colleges and libraries have been received, asking for sample copies and permission to use the posters. From a representative of the United States Treasury came a wire asking authority to employ the Tokio Kid in a War Bond campaign.

It would be well if this Jap-Ally of ours were leering at people wherever his words of wisdom would be of value. He can not only help in mate-

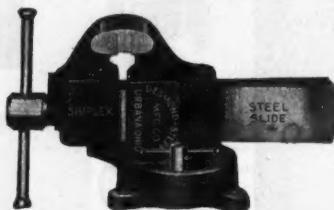
rial conservation but human ingenuity can devise new ideas for posters and captions to influence nearly any endeavor leading towards an early extinguishment of the "Rising Sun," and a conversion of the "Fuerher" to "the Fearer." Programs for the Combating of Needless Absenteeism can well use his services. Many other new ideas can be developed for the common good and the Douglas artists and the Industrial and Public Relations Department welcome ideas and opportunities to be of assistance.

DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dresser and Cutter for all of your grinding wheels.
Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX Steel Slide VISES



A full line of Machinists', Filers, Welders, Production and Drill Press and Milling Machine Vises.
Let us send you our vise catalog and name of your nearest dealer.



THE DESMOND-STEPHAN MFG. CO.
URBANA • OHIO

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Multiplying THE USES OF STANDARD TOOLS

You can make standard machine tools perform many "extra" functions . . . multiply the usefulness of these machines . . . do simple or compound angle drilling, milling, grinding, key-slotted, die sinking, reaming and many other difficult precision angle machining operations . . . with WESSON Universal Vises. They slash hours off your set-up and tool-up time! Extreme rigidity . . . freedom from "chatter" . . . permits high precision at high speed! Compact . . . lower height than any other Universal Vise . . . works in closest quarters. Boost production on your present equipment with WESSON Vises!

Less
SET-UP TIME

AVAILABLE NOW

WESSON CO.,
Detroit, Michigan
(Ferndale Station)

Name and Title.....

Firm Name.....

Address.....

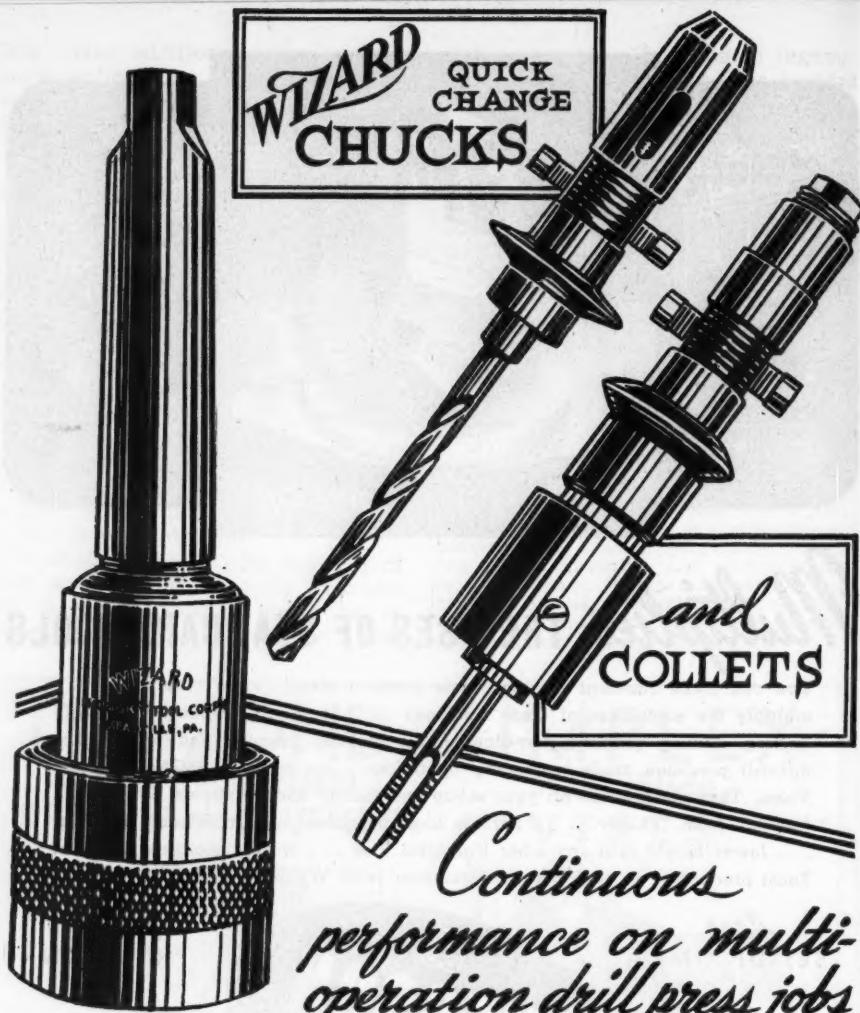
City & State.....

Greater
PRECISION

IMMEDIATE DELIVERIES



Please send me illustrated
bulletin of WESSON Uni-
versal VISES and ANGLE PLATES.



WITH a McCROSKEY WIZARD Outfit an operator can change tools quickly and easily without stopping or slowing the spindle. Tools are held rigid and centered, permitting horizontal as well as vertical use. For Chuck and Collet Manuals and Bulletins, write to McCROSKEY, MEADVILLE, PA.

McCROSKEY TOOL CORPORATION
MEADVILLE, PA.

**COST
CUTTING
TOOLS**

PROSSER CARBIDE GRINDERS

● Modern, streamlined grinders for most rapid rough grinding and finest finishing of carbides, stellite, high speed steel, and other modern tools. Bench and floor type machines, of several capacities, for wet or dry grinding, as desired. Attachments for chip breaker and drill grinding.

FEATURES OF PROSSER GRINDERS

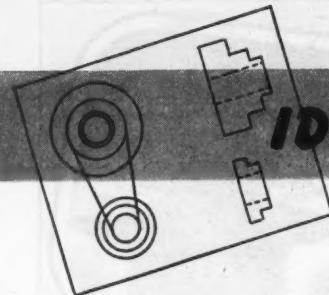
- Quick-acting indexing tables.
- Adequate wet - grinding equipment.
- High grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- Moderate price.

**Prompt Deliveries
Write for Details**

Thomas Prosser & Son
20 WALL STREET NEW YORK

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IDEAS FROM READERS

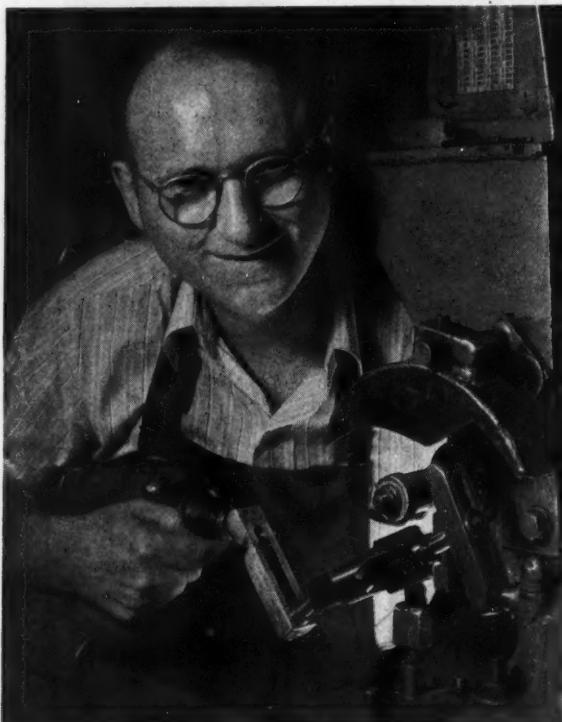
Tap-Grinding Attachment

THE illustration shows an attachment that has been developed by Chester E. Mann, tool grinder at the Caterpillar Tractor Company, Peoria, Illinois, for grinding the leads on taps

of the larger sizes.

The attachment consists primarily of two cross arms, each with a taper shank by which it is held in the head or tailstock, and each carrying an adjustable center for holding one end of the tap. The arm at the right in the photograph is set on a 55-degree angle and that at the left, or headstock end, is set at an angle of 33 degrees. By adjusting the centers the tap can be set at any angle desired. A protractor is used in setting the centers to the correct angle.

To obtain the correct clearance on the tap, a concave radius is dressed in the wheel face by using a pencil diamond dresser. The wheel is a Norton No. 3860-L, $1\frac{1}{2}$ x $\frac{1}{2}$ inch.



Chester E. Mann Demonstrating the Tap-Grinding Attachment that He Developed for Grinding Large Taps



PART NUMBERS

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT *and* ROUND SURFACES

Sure - Fast - Accurate

OBSOLETE HAND STAMPING

SAVES [PARTS
LABOR
STAMPS

Eliminates POOR MARKING
ERROR — NOISE

Speeds . . . DELIVERIES

ALSO ADAPTED TO CERTAIN
KNURLING OPERATIONS

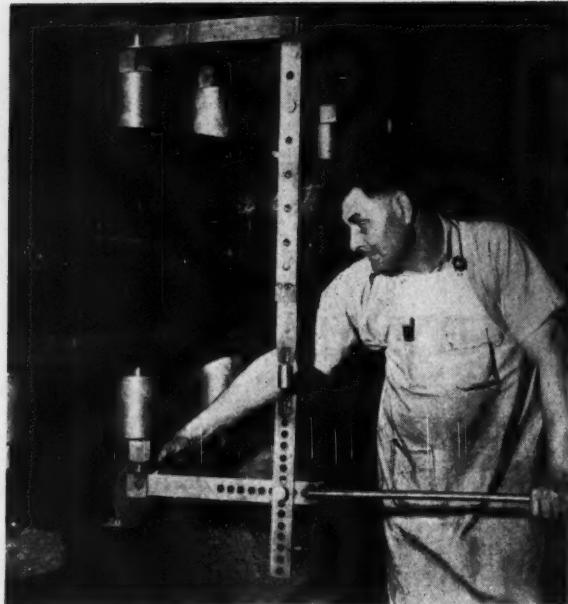
This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.

1806 BELLE PLAINE AVENUE

CHICAGO 13, ILLINOIS



Adjustable Holder for Large Nuts Makes Assembling Easier and Safer

75 pounds, which meant that a crane had to be used to hold them while they were started on their threads. Even with the aid of the crane the nuts couldn't always be held securely; thus the danger was always present that a nut might fall on a workman's toes.

Solini's device, for which he received a \$75 award through the Company's suggestion system, has a horizontal arm across the top, in the end of which is a center point that is hooked into the center

hole in the upper end of the stud. The device is made in two sections, each with a vertical arm, so that the device can be adjusted for length by means of a stud through holes in these vertical arms.

At the lower end of the vertical bar on the lower section is a flat section, the two pieces being held together with a coupling which permits 360-degree rotation of the lower section. The vertical flat section is held to a

Assembling of Nuts Made Safer and Easier

ASSEMBLING or removing large nuts from the underneath sides of heavy apparatus was a difficult—and sometimes dangerous—job until a device to hold the nuts in position was developed by Samuel Solini, a machinist in General Electric's Schenectady Works Turbine Shop.

Some of the nuts weigh as much as

Miscro *Supreme* IMPROVED LAY-OUT DYE

for TOOL, DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL

for SHARPLY DEFINED SCRIBED LINES

LOW IN PRICE

One Gallon, \$4.25

MICHIGAN CHROME & CHEMICAL COMPANY
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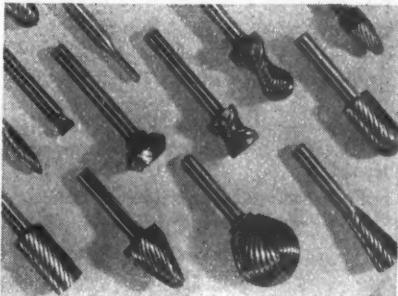
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SEVERANCE DISC CUTTERS SPEED FINISHING OF PLASTICS

When it comes to finishing moulded plastic parts, you can't beat Severance Cutters. One efficient installation is shown here. A Severance rotary disc cutter mounted on a spindle with an adjustable table allows perfect finishing of the rough edges with amazing speed. Severance disc cutters are made of High Speed Steel, in a wide range of sizes. Staggered pattern teeth produce a shearing cut, eliminate chatter.

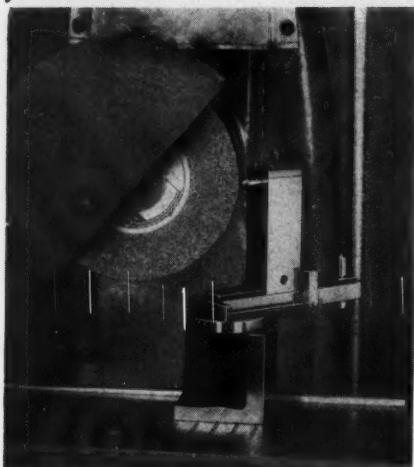
If you are having difficulty in finishing manufactured parts, send samples. Our Engineers will design cutters to solve your problems. Severance complete line of "Carbide" Midget Milling Cutters are now available.



Severance Tool Industries Inc., Saginaw, Michigan. Plants in Long Island City, N. Y.; Detroit, Mich.; Fort Wayne, Ind.; Chicago, Ill. and Los Angeles, Cal.

Severance

The FORM-MASTER ANGLE AND RADIUS DRESSER



An all-purpose angle and radius dresser for high-precision at low cost. Accurate easily within .001". Simple to operate. Dresses in horizontal position enabling operator to SEE the form in work. All parts hardened and ground (except cast-iron base which can be drilled and tapped). Suitable for surface and cylindrical grinders. Two $\frac{1}{2}$ ct. diamonds and instrument case included—\$150.00 complete.

It readily produces: Any desired angle; Convex radii to 4"; Concave radii to 7"—on 7" wheel.

Specifications: Base 3"x3", height 8 $\frac{1}{2}$ "; Wheel capacity 8"; Angular travel 3".

For information or a demonstration

CALL YOUR SUPPLIER

Manufactured by

J. & S. TOOL CO.

477 MAIN ST., EAST ORANGE, N. J.

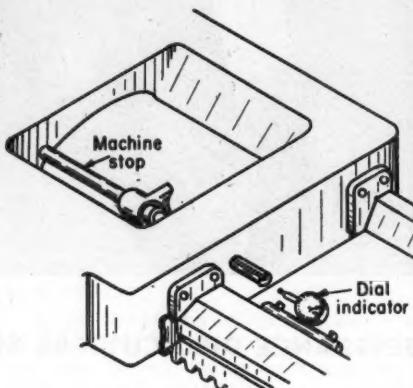
PRECISION DRESSING TOOLS

horizontal flat section by means of a stud which can also be adjusted to provide variations in leverage.

The plate upon which the nut is positioned at the end of the lever arm is on a pivot so that it can revolve with the nut. A wrench can be held in position on the nut by the lever arm for tightening.

Dial Indicator Lathe Stop

A REFINEMENT in the stop on a hand turret lathe suggested by a foreman at General Electric's Fort Wayne Works has resulted in savings



Dial Indicator on Lathe Provides Stop to Close Limits

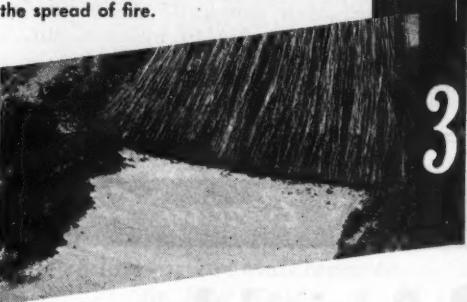
per machine which are expected to amount annually to 225 machine hours, 225 man hours, and 1000 pounds of material by reduction of spoiled work.

Previously, because the "touch" of different operators varied, the regular machine stop would have to be reset by trial and error to suit each operator before good pieces could be obtained. Foreman Norman Bender suggested that a dial indicator be added to the carriage of the lathe so that

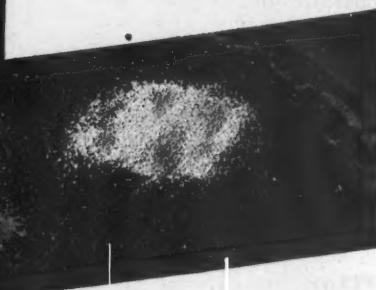
How to Have OIL-FREE, NON-SKID FIRE-RETARDANT FLOORS



1



2



3

Note the rapidity with which ABSORBO soaks up oil—up to 45% to 50% of its weight—from any type floor—wood, metal, concrete or linoleum.



ABSORBO has been approved by Underwriters' Laboratories as a Class 1 non-combustible.



Send coupon for 50 lb. bag with an unconditional money-back guarantee.

FIDELITY CHEMICAL PRODUCTS CORP.

Dept. E4, 430 Riverside Avenue, Newark 4, New Jersey

Gentlemen: Send 50 lb. bags of: Absorbo Oil & Grease Absorbent and Floor
Cleaner at \$2.75 per bag, F. O. B. Newark 4, New Jersey.

Substantially reduced prices for quantities.

Name.....

Address.....

Attention of.....

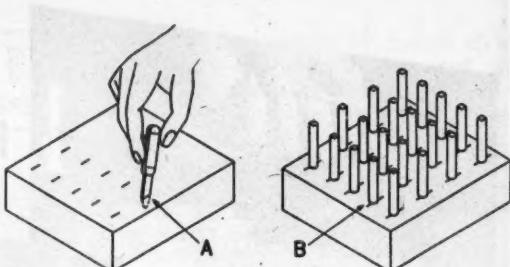
Signed..... Title.....

the operator could run the carriage to the correct setting, adjust the stop, and set the dial indicator to zero. With the aid of Bernard Kramer, a machine operator in the shop, the idea was applied as shown. The method provides an absolute stop to close limits for all operators, regardless of differences in touch.

Rubber Drill Holder

By A. H. WAYCOFF

TAKING care of small drills and having them at hand when needed sometimes presents a bit of a problem, but the problem is easily solved if one can find a small block of rub-



Small Rubber Block Makes Ideal Holder for Small Drills

ber. Such a piece can be cut from an old rubber engine mount or similar scrap piece.

It is only necessary to punch the point of a pen knife down into the rubber in order to make a slit, as shown at A, and there should be as many slits as there are drills. The



CRITERION Boring Heads

Original Accuracy Maintained

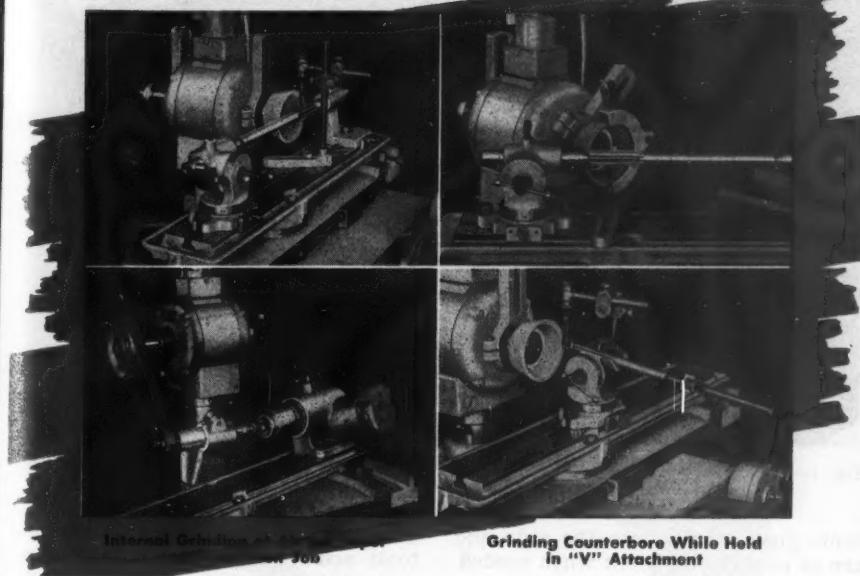
Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1 1/2" and 3". 1/2" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead Screw
ground from
solid AFTER
hardening.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

Forming the Land on a Reamer

Grinding a $\frac{1}{2}$ " Counterbore on Reamer



Internal Grinding on a Reamer Job

Grinding Counterbore While Held
in "V" Attachment

THE NEW *Knock-Out* UNIVERSAL TOOL GRINDER

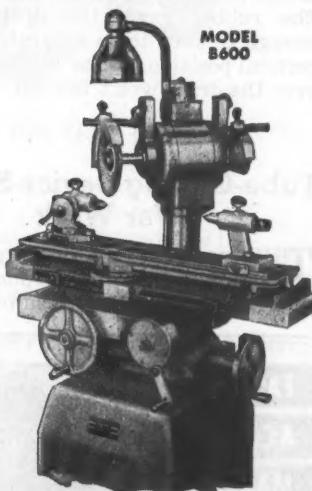
Production or Maintenance
At Low Cost

MANY FIXTURES AVAILABLE

New 16-Page Literature
Just Off the Press!

KNOCK-OUT

Write For
Bulletin No.
UTG-43-M



THE K. O. LEE CO.

ABERDEEN

SOUTH DAKOTA

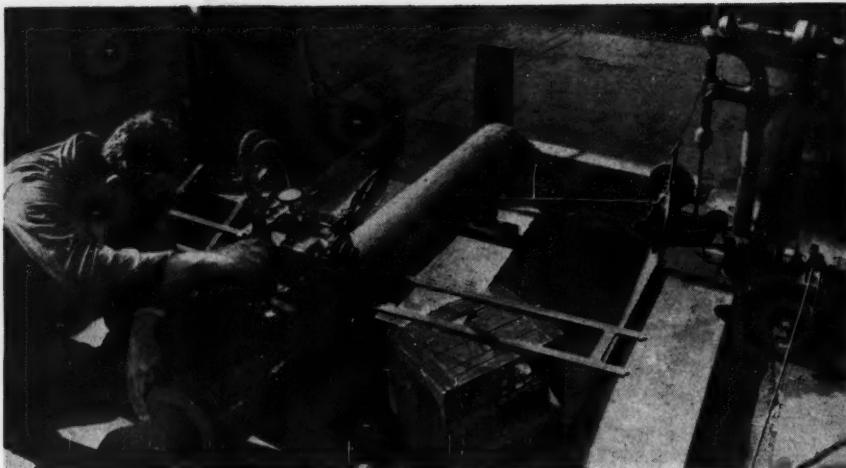


Fig. 1—Tubing Revolves Beneath a Stationary Cutting Torch as the Drill Press Reels in Wire Wrapped Around the Tube

drills push readily into the slits and are as readily pulled out when needed. The rubber grips the drills firmly enough to keep them separated and in vertical position. If the block is tipped over the drills won't fall out.

development of several interesting tools and methods to aid in making prompt deliveries on subchaser parts.

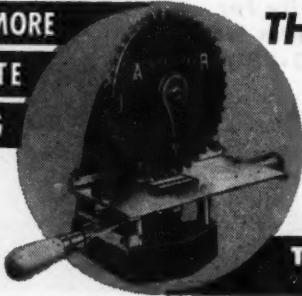
Unable to obtain either castings or solid rounds with which to make the part shown in Fig. 1, the manufacturer — F. J. Valentine, Inc. — finally located a supply of 150-pound seamless tubing that would answer the purpose if it could be cut to short lengths. However, he possessed no power saw or other suitable machine equipment, and was unable to find a job shop willing and able to do the work. He finally worked out the solu-

Tube-Cutting Device Speeds War Work

THE ingenuity of a Brooklyn manufacturer in solving production and priority problems has resulted in the

FASTER, MORE
ACCURATE
MARKING

Write for
Descriptive
Literature.



THE ACROMARKER

The No. 1 Model is especially suited for fast marking, numbering and lettering serial numbers, voltage indications, code letters, identification marks, manufacturers' key, etc. Easy to operate, the No. 1 Acromarker requires merely a swing of the handle to exert powerful screw pressure of the dies on the parts to be marked. Dies are automatically advanced for character spacing, and are replaceable.

THE ACROMARK COMPANY

2 MORPELL STREET

ELIZABETH NEW JERSEY

Do it Faster
by Air!



SPEEDY AIR VISE *

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE!

America's war plants are switching to new, powerful Speedy Air Vises! From a single vise . . . to an installation of fifty . . . they are saving time, effort and labor costs! Air operated, *foot controlled*—both hands are left free for more rapid drilling, tapping, light milling, assembly, etc. **\$24**

Complete with Foot Control Valve, Air Hose and Fittings, only

DELIVERY 7-10 DAYS! ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

AIR REGULATOR

Precision-built. Delivers pressures up to 140 lbs. With gauge, \$4. Less gauge, \$2.50



AIR FILTER

Keeps water and particles out of the regulator and pneumatic tools. \$1.50

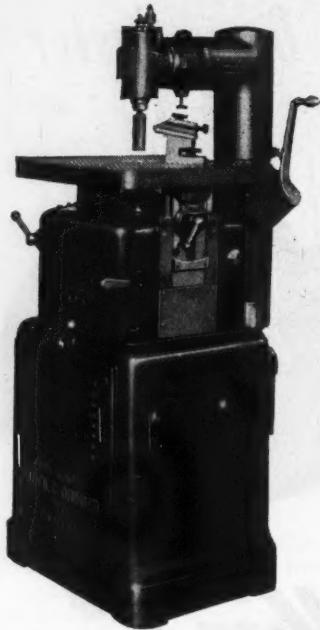


BLOW-GUN

Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . \$2.50



W. R. BROWN CORP., 5725 ARMITAGE AVE., CHICAGO 39, ILL.



BOYAR - SCHULTZ No. 2 PROFILE GRINDER

**For Fast, Accurate, Economical
Grinding of Profiles and
Contours**

Fast and accurate because both independently powered spindles operate at 10,000 R.P.M., assuring rapid stock removal even with wheels as small as $1\frac{1}{2}$ " diameter. This permits grinding in confined openings.

Economical because it saves time, quickly doing jobs that would otherwise be done by hand or require time consuming "set-up" on machines of other types.

Made in two models . . . Dual Spindle as shown above or with the Single lower Spindle.

Boyar-Schultz Profile Grinder No. 2 is a truly versatile machine tool. Many of its users have discovered that it is as efficient in production grinding as it is in the tool room.

Write for Circular Describing It In Full

BOYAR - SCHULTZ CORPORATION

2120-A Walnut St.

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tion by rigging the equipment shown in Fig. 2, using odd parts and an old drill press.

As shown, the tubing is supported on rollers in a horizontal position and revolved while sections of the correct length are cut off with a stationary cutting torch. The rack upon which the torch is mounted rests on two boxes, one each side of the tube.

To obtain an even, slow revolution

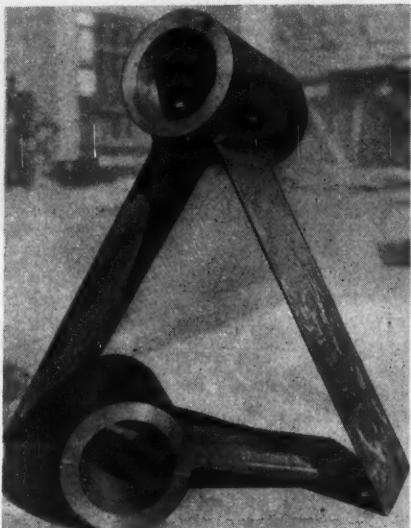
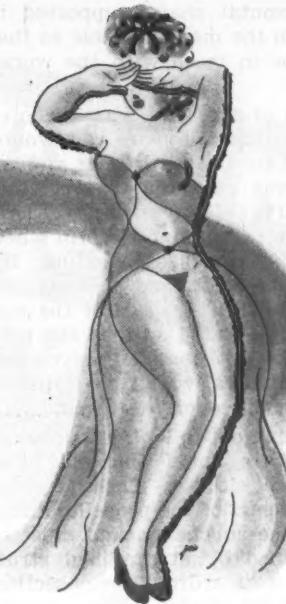


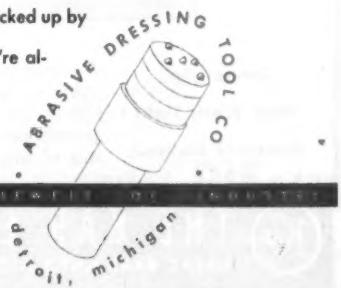
Fig. 2—The Complete Welded Assembly Showing Strut Members as Ground After Being Flame-Cut in Four Deep Bevels

of the work, a "Buffalo" drill press was set off at one side and a worm and worm wheel were mounted in the machine in such manner that a wire, previously wrapped around the tubing, could be used to revolve the work-piece. The worm shaft was chucked in the drill press chuck with the lower end of the shaft extending into a hole in a plate that was clamped to the drill press table, thus preventing the shaft from springing away from the wheel. The worm wheel was mounted

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Yes, mister, it's a tough grind . . . with plenty of bumps along the way. But you can ride those production schedules with more confidence when Abrasive RED BAND diamond tools are dressing on your grinders. You'll get better work, more work per set-up because the advanced engineering of our exclusive "Oxide-Free Process" is backed up by three generations of diamond experience. You're all ways ahead with Abrasive. Write for catalog and details.



on a horizontal shaft, supported in bearings on the machine table so that it would be in mesh with the worm, as shown.

One end of the wire was anchored to the tube, then the wire was wound around the tube several times and the free end was anchored to the worm wheel shaft. When power was applied to the machine, the worm wheel was slowly revolved, winding the wire on the shaft and causing the tube to rotate. The speed of the machine was regulated so that the tube would make one complete revolution in three minutes, which conforms to the cutting speed of the torch.

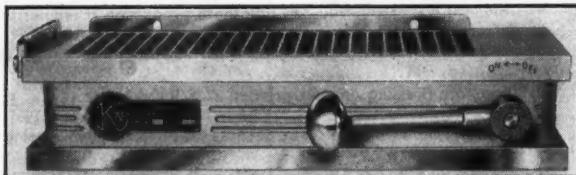
After being cut to length, the pieces of tubing are bored out and fitted with bronze sleeves. These bearing sleeves are part of the propeller mechanism of the subchaser, and must be supported by streamlined struts shaped to a "teardrop" cross-section. In shaping the struts, the resourceful

manufacturer again utilized the cutting torch.

The unshaped struts, 1½ inches thick and rectangular in section, are set upon edge beneath a cutting torch mounted on a Radiograph. The Radiograph makes two deep bevel cuts into each edge, literally machining a "teardrop" shape, which is later rounded off by grinding. The time required for both cutting and grinding is considerably less than ordinary machining would consume, and the Navy deadlines are met.

Holden Liquid Carburizing Baths is the subject of a 20-page bulletin prepared by The A. F. Holden Co., New Haven, Conn. The bulletin includes necessary instruction for operating Holden Liquid Carburizing Baths and illustrates and describes results obtained at various operating times and temperatures. Advantages and applications of Holden Liquid Carburizing Baths are presented in list form. Copy of bulletin free.

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Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

Collar Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.



\$55.00

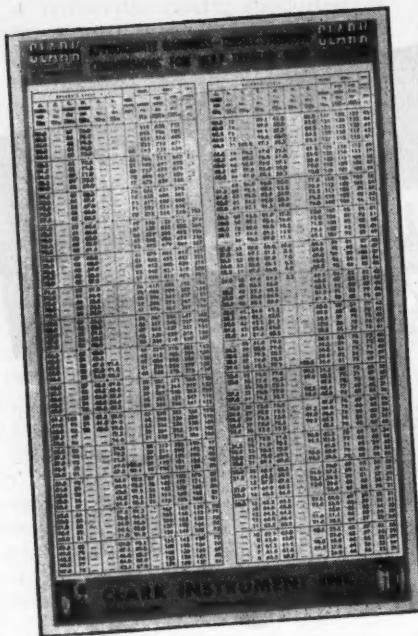


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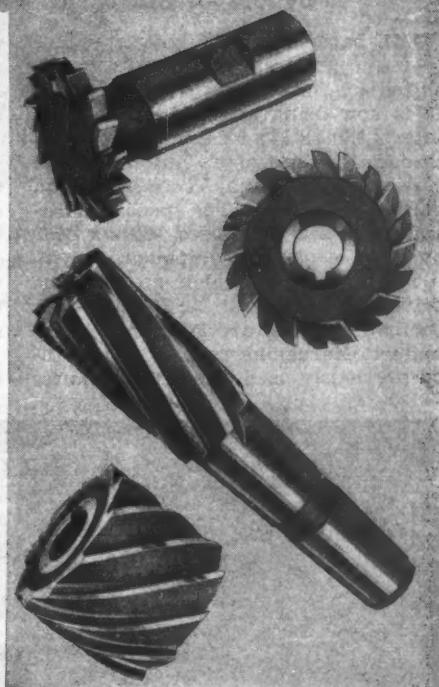
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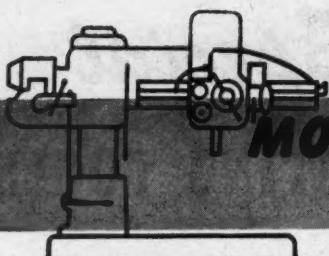
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MODERN EQUIPMENT AT WORK

Sprocket Hardening Speed Increased 133 Per Cent

by Use of Automatic Induction Heating Fixture

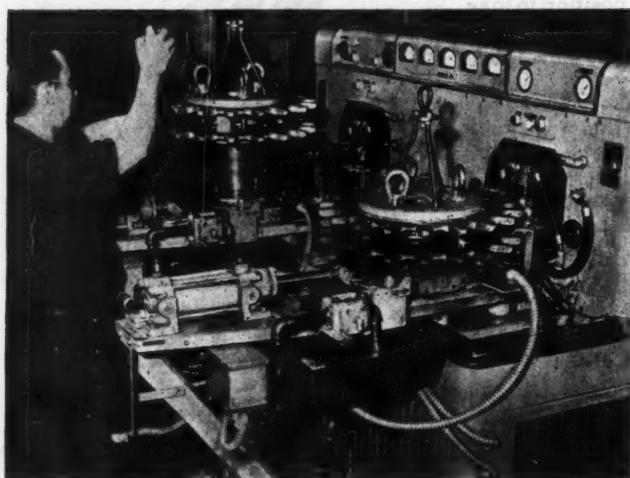
THE hardening of 36 large sprocket teeth in less time than was required by former methods to harden 18 is now being accomplished by the International Harvester Company through the use of an automatic fixture installed on a Tocco induction hardening machine. The speed of hardening has been increased 133 per cent by the use of this equipment.

The sprockets, which go into the drive mechanism of Army half-trac combat vehicles, are 24 inches in diameter. Hardening time by the method previously used was seven minutes

per sprocket. Now, with the automatic fixture, the sprockets are hardened in pairs—a pair every six minutes.

The automatic fixture holds two sprockets horizontally, presenting two teeth to the water-cooled inductor simultaneously. Upon completion of the hardening cycle, the fixture withdraws the sprockets, indexes, and advances again to the inductor. Operation is entirely automatic once the starting button has been pushed.

The heating cycle consists of a 10-second heat, 4-second quench, and 6-second index for a total of 20 seconds per two teeth. The machine is a



Using this Tocco Induction Hardening Machine and a Special Double Fixture, Sprockets for Half-Trac Combat Vehicles are Hardened in Three Minutes Each. The Fixture in the Foreground is Presenting Two Sprockets to the Induction Heating Zone While the Operator Changes Workpieces on the Fixture at the Rear. The 36 Teeth on the Two Sprockets are Hardened in Six Minutes Even

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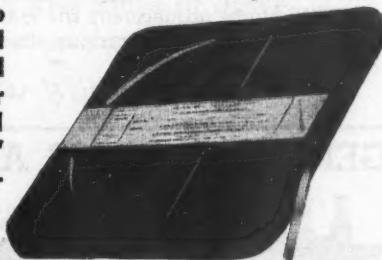
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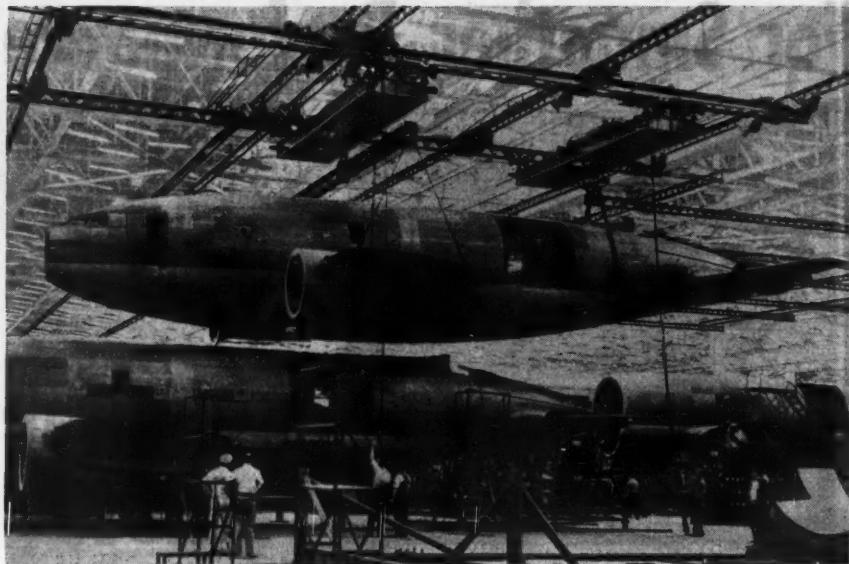
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Curtiss Commando Air Transport Being Moved During Construction

standard 50 KW, two-station Tocco unit of 9,600 cycles. The sprocket teeth are each $2\frac{1}{4}$ inch deep, $1\frac{1}{4}$ inch wide at the base, and $\frac{5}{8}$ inch wide at the top. A hardness of 51-58 Rc is confined to the top and pitch line of the tooth, with depth not in excess of $5/32$ to $3/16$ inch. The surfaces between the teeth are not hardened. With slight adjustment the machine can be adapted for various sizes of work.

Transfer Bridge System Aids in Building Planes

THE giant C-46 Curtiss Commando Air Transports now being turned out in a New York State plant of the Airplane Division of Curtiss-Wright Corporation get their first boost upwards with a 10-ton transfer bridge system which was especially designed and built for this task by The Cleve-

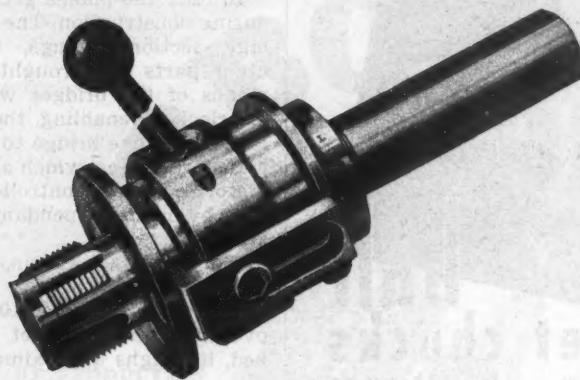
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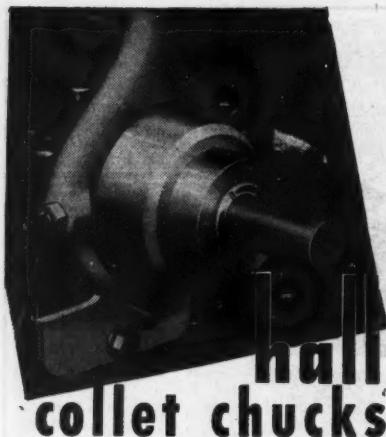
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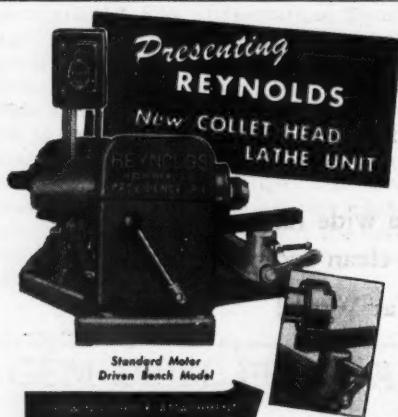


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In fact, the planes get several rides during construction. The various fuselage sections, wings, engines, and other parts are brought together by means of the bridges which may be interlocked, enabling the transfer of loads from one bridge to another. The transfer bridges, which are completely motorized, are controlled from the floor by means of pendant push-button stations.

The airplane shown, when completed, is approximately 76 feet long, with a wing spread of 108 feet and an overall height of 22 feet. Fully equipped, it weighs approximately 14 tons.

Vibration Problem Solved

VIBRATION in the grinding machines at the plant of John Bath and Company, Worcester, Mass., developed into a serious problem recently. The vibration in one machine in particular was causing a large percentage of rejects of the high precision taps which comprise a part of this company's line of products.

An investigation made with a General Electric electronic vibration-velocity meter revealed that a set of gears in the machine indicated was causing the vibration. Replacing the gears eliminated the difficulty.

The Bath Company also found the meter valuable for detecting low-vibration areas in its plant, thus facilitating the placing of new equipment in areas where maximum operating efficiency could be assured.

Consisting of a vibration pick-up unit and electronic amplifier unit, the meter measures vibration velocity and, together with an integrating unit, vibration displacement. The amount of vibration can be analyzed graphically by the use of an oscilloscope fed by an amplifier.

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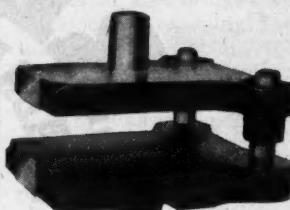
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For all war plants producing dies for power presses or for any metal stampings or plastic moulds, PRODUCTO is ready to serve you. Hundreds of combinations are available at our factory and assembly plants. Accuracy and interchangeability of all components in Producto Die Sets makes it easy for the tool and die maker. Our 100-page catalog tells the story. Contact our factories below or Die Supply Company, Cleveland, Ohio; Jamison Steel Corporation, San Francisco and Los Angeles.

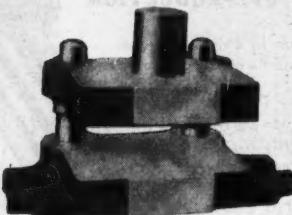


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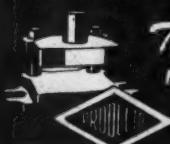
REGULAR TYPE



ALL STEEL TYPE

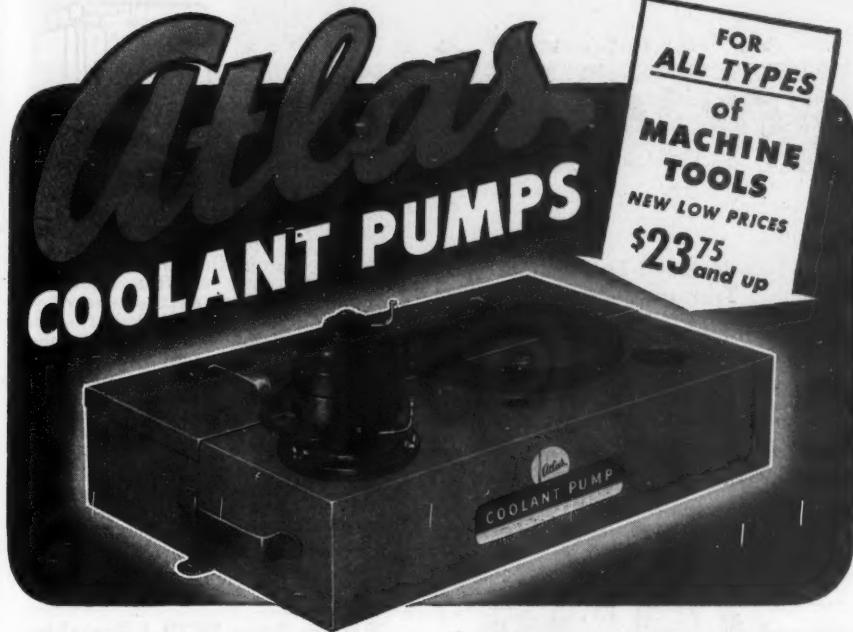


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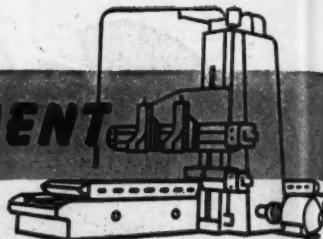


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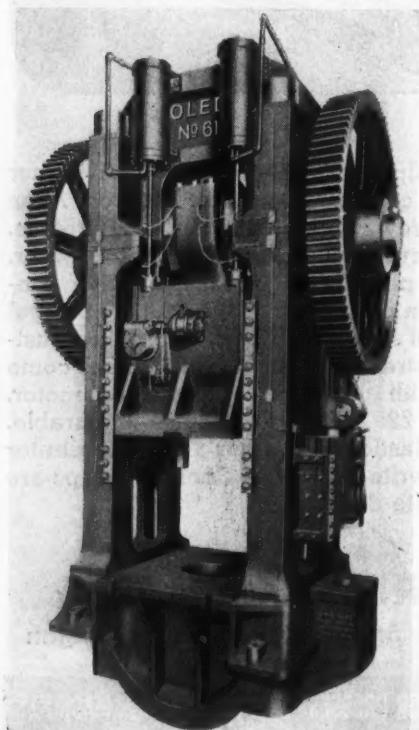
NEW SHOP EQUIPMENT



Bliss-Toledo 2,000-Ton Mechanical Trimming Press

Announced by the E. W. Bliss Co., 53rd St., and 2nd Ave., Brooklyn 23, N. Y., the Bliss-Toledo 2,000-Ton Mechanical Trimming Press shown herewith is said to be capable of trimming the average run of forgings emerging from a

Bliss-Toledo 2,000-Ton Mechanical Trimming Press



hammer of approximately 33,000 lb. capacity. Operating at five strokes per minute, the machine is triple geared with twin drive on the crankshaft. Other features include a four-piece tie-rod frame construction, multiple disc flywheel type air friction clutch, and brake with electric push-button control.

Specifications of the Bliss-Toledo 2,000-Ton Mechanical Trimming Press are as follows: stroke of slide, 24 inches; shut height (minimum distance top of bed to slide), 42 inches; slide area, 87 x 60 inches; bed area, 98 x 72 inches; weight, 450,000 pounds.

Sciaky Type PS2R-1 Portable Spot Welder

Designated as the Type PS2R-1, a radial-type gun spot welder specially designed for welding aluminum and light alloys has been developed by Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill. According to the manufacturer, tacking operations as well as structural welding on large or fixed aluminum assemblies can be performed with maximum speed and efficiency by means of the unit, which employs the stored energy principle and variable pressure cycle incorporated in Sciaky standard press and rocker arm type welders.

The Type PS2R-1 welder is rated at 100 kw. and has a capacity for welding double thicknesses of aluminum from 0.016 up to 0.064 inch, and double thicknesses of corrosion-resisting steels from 0.016 up to 0.080 inch. The cables are connected to the gun on horizontal water-cooled copper bars of heavy section, an arrangement which permits the use of light section cables since electrical losses are reduced to a minimum. The flexible design of the cables makes operation of the gun comparatively easy.

The control cabinet, main welding reactor, monorail, and special copper bars connecting the gun to cables are incor-

Sciaky Type PS2R-1
Portable Spot
Welder

porated into a single unit which is mounted on a stationary column and pivots on a vertical axis by means of ball bearings located inside the column. The unit can be pivoted 180 deg., and the area covered by the welding gun is represented by a half circle of 23 feet in diameter. Maximum transversal movement of the gun in a straight line is 12 feet and vertical movement, 20 inches above and below a central position. The weight of the gun and cables is compensated for a balancing device, and the gun travels a distance of 3 feet



4 inches on the monorail. Pressure as high as 1,600 lb. is supplied to the gun by means of a special air-operated hydraulic booster.

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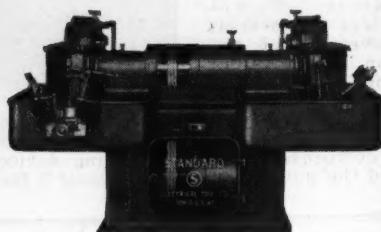
There's only one answer where a portable tool of constant power is indicated—Haskins Flexible Shaft Equipment. Light and easy to handle, yet sturdy and dependable, it will turn out more work and better work—faster. Fatigue is negligible. Thirty models, each capable of handling many different jobs. Write today for your copy of Catalog 45. R.G. Haskins Company, 619 So. California Avenue, Chicago, Illinois.



The Sciaky Type PS2R-1 Portable Spot Welder is available in a variety of horizontal and vertical gun types and may be either stationary or buggy-mounted.

"Standard" Chisel Grinder

The Standard Electrical Tool Co., Dept. D-17, 2490 River Rd., Cincinnati 4, Ohio, announces a heavy duty, double-end, self-contained, belted, motor-driven grinder with attachment for the uniform grinding of a wide variety of chisels on a production basis. According to the manufacturer, up to 1,000 chisels per day per man can be ground by means of the machine, which is not only intended for



"Standard" Chisel Grinder

grinding of new chisel blanks, but also for redressing of used chisels.

The "Standard" Chisel Grinder is designed for use with 2½-inch face x 20-inch diameter high speed resinoid bond wheels which are mounted on spindle operating at 1,700 r.p.m. The machine is equipped with flanges for 8-inch hole wheels.

The wheel guards incorporate con-

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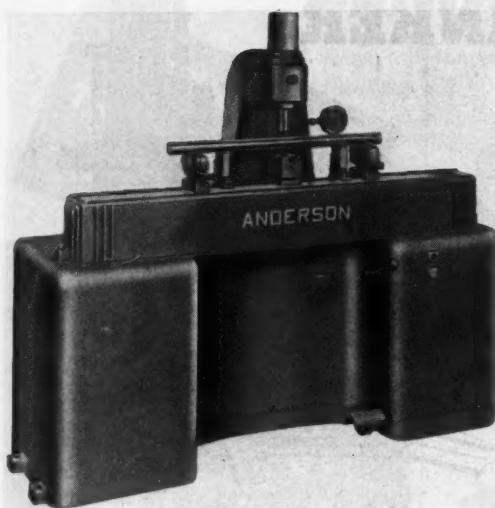
Fully 30 years ago, he decided there must be some less tedious way to "clean up" his dies . . . to get the hard, sharp contours true to the blueprint design. So he himself invented the way—and the hand-cut rotary file thus arrived to substitute quick precision for tiresome drudgery.

His experience then—and through

the score of subsequent years devoted to rotary file pioneering—is all part of RFC history. Many hundreds of industrial plants have profited by this experience . . . and today recognize RFC HAND-CUT ROTARY FILE accuracy and speed as genuine factors in promoting War plant and essential civilian-use production.



*The ROTARY
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STRATFORD, CONN.



Anderson Model HP-010-P Hydraulic Straightening Press

nounces a sensitive, high speed, hydraulic straightening press designated as the Model HP-010-P. The machine has a maximum capacity of 10 tons, yet is said to be so sensitive that a shaft may be bent as little as 0.001 inch.

The pressure gage which indicates the ram loading is conveniently mounted near the work at eye level to facilitate quantity production. Beneath the ram at the point of maximum deflection of the workpiece is located an adjustable dial indicator which clearly shows the amount of shaft runout in the preloaded, fully loaded, and unloaded positions.

The Model HP-010-P press is equipped with a Barnes hydraulic system which includes a unique rotary control valve

that provides for flexible, sensitive control of the press. This valve is operated from the front of the machine by a control lever which, when depressed, causes a corresponding increase in the load applied to the work. Push-button control of the hydraulic unit is provided for starting and stopping, although no load can be applied to the ram until the lever is depressed.

Safe operation is said to be assured through the use of a spring return mechanism for the control lever. Release of the lever not only reduces the load immediately but also causes the ram to return rapidly. Thus, loading and unloading time between operations is cut to a minimum. Ease of operation is assured, since the operator has complete control of the press simply by use of

struction which allows for quick and easy removal of grinding wheels. Each guard is furnished with necessary water fittings and adjustable nozzle with valve for controlling flow of water over tool being ground. The water is supplied to each wheel from a large tank which is mounted on the back of the machine and is fitted with a motor-driven pump having a capacity of 10 gallons per minute.

Anderson Model HP-010-P Hydraulic Straightening Press

As a supplement to its line of hand presses, Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill., an-

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LENOX Instruments explore the dark holes of industry—guns, turbine rotors, hollow shafts, tubes, tanks, well drill pipe, cartridge cases, etc.

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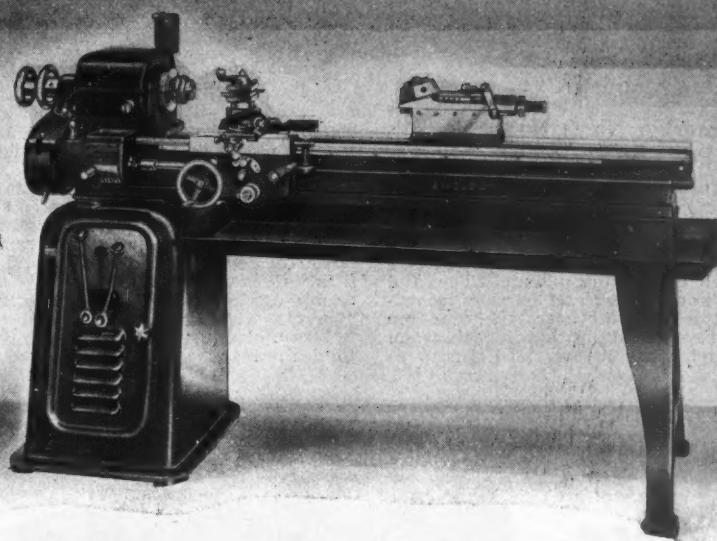
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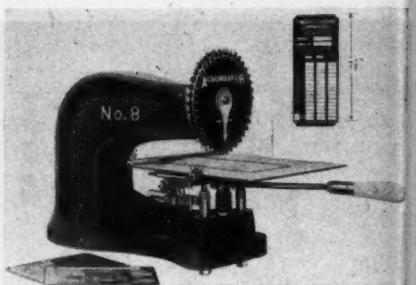
PRECISION TOOLROOM AND PRODUCTION LATHES

Best known as quality toolroom lathes, **SHELDON** Precision Lathes are also ideally suited for much second operation and other production work because of their extra collet capacity, sturdy construction, accuracy and available production features, including: Lever operated Bed Turret, or Tool Post Turrets, Lever operated Collet Attachments, Tailstocks, Double Tool Posts, 4-speed underneath motor drives, etc. If you are looking for a 10", 11" or 12" Precision Lathe for the Tool Room or Production Line, be sure to see the **SHELDON** Lathe before you order.

SHELDON MACHINE COMPANY, INC., 4250 N. Knox Ave., Chicago 41, U. S. A.

the control lever. By depressing the lever until the desired load is attained and then releasing, the operator is able to complete the cycle.

The length of the work table of the Anderson Model HP-010-P Hydraulic Straightening Press is 60 inches. Available table attachments include checking rolls, spring-loaded centers, and adjustable anvils. To further increase production speed, an adjustable stop collar is provided which may be used to limit the 6-inch maximum stroke of the ram. Hand-operated control equipment is standard, however, provision can be made for foot operation.



Acromarker No. 8 Name Plate and Parts Stamping Machine

Acromarker No. 8 Name Plate and Parts Stamping Machine

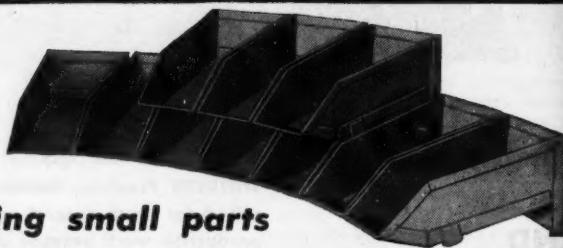
The Acromarker No. 8 Name Plate and Parts Stamping Machine shown herewith, product of The Acromark Co., 9 Morrell St., Elizabeth, N. J., is designed for stamping numbers and letters into steel, brass, zinc, plastic, fiber, and pressed wood plates and parts. According to the manufacturer, the machine can be used to stamp specifications on plates and parts in any position up to

9 inches from the top, and will accommodate pieces up to $2\frac{1}{2}$ inches thick and as large as 10 x 12 inches.

Automatic advance moves plate or part being stamped in a level plane to the left after each character is stamped, spacing each letter or figure evenly. A powerful screw operated by hand lever lifts table with work, held by thumb clamp, against heavy duty marking dies. The die wheel, carrying a full set of letters and figures, can be easily turned to desired character.

NEW BINS

for assembling small parts



Floors slope to feed parts to front — end reaching and fumbling.

All-welded construction.
Rolled, smooth edges.

Bins taper toward front to form convenient semi-circle
—keep all bins within easy reach.

Nesting, locking construction
for rigid set-ups, easily
changed when necessary.

Two sizes—tapered or straight edges.
Hoppers available for steady work.

Write Stackbin Corporation, 53 Troy St., Providence, R. I., for further details
and low prices.

STACKBIN

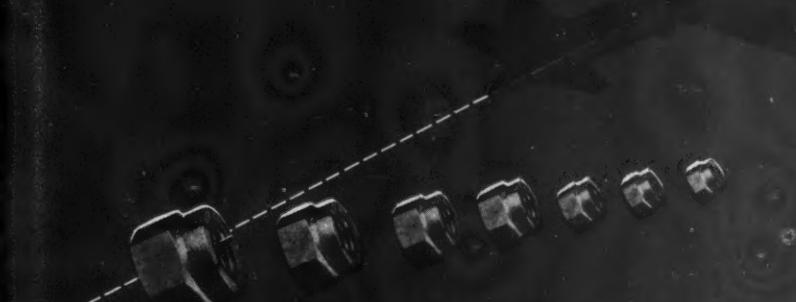
"Stacked and

STACKBIN CORP., Providence, R. I.



SYSTEM

Still Accessible!"



"HOLD EVERYTHING"

Clipped by the
most powerful
and longest tool bits on the job!

On the job, plane, drill, cut, set, notch, not
go on to turn, bore, countersink, countersink
surface. These remarkable properties of

Vanadium-Alloys are the result of a
new scientific development in metal
alloying. The new Vanadium-Alloys
are the most powerful and longest
lasting tool bits ever developed.



Vanadium-Alloys



Hammond Redesigned 14-Inch "Wet-N-Dry" Carbide Tool Grinder

Detailed operating instructions are supplied with the Acromarker No. 8 Name Plate and Parts Stamping Machine, thus enabling accurate stamping operations to be readily performed by unskilled workers. Extra die heads of sizes ranging from $\frac{1}{8}$ to $\frac{1}{2}$ inch are available for the machine for use in stamping various size letters and figures in workpieces. The deep throat and long stroke of the unit are said to allow for easy assembly of special fixtures for holding irregularly shaped pieces for stamping.



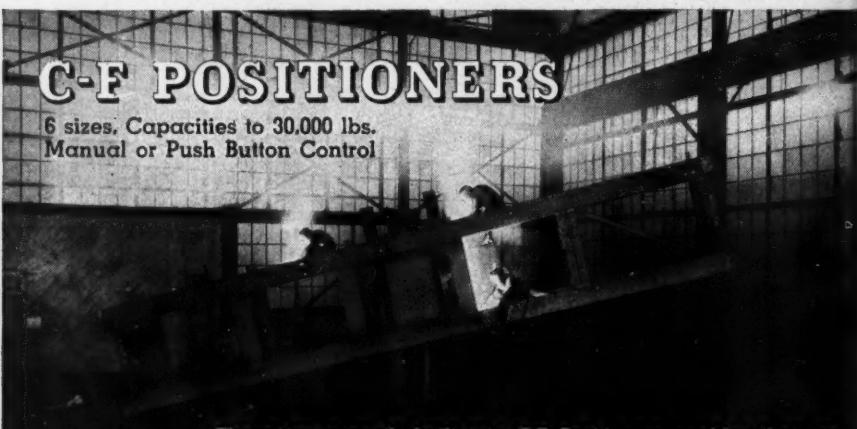
Hammond Redesigned "Wet-N-Dry" Carbide Tool Grinder

A "Wet-N-Dry" carbide tool grinder incorporating many new and improved

features of design is announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54, Mich. Available in 10 and 14-inch wheel sizes, the machine includes new coolant control features which are said to enhance the facilities for properly flooding cut-

C-F POSITIONERS

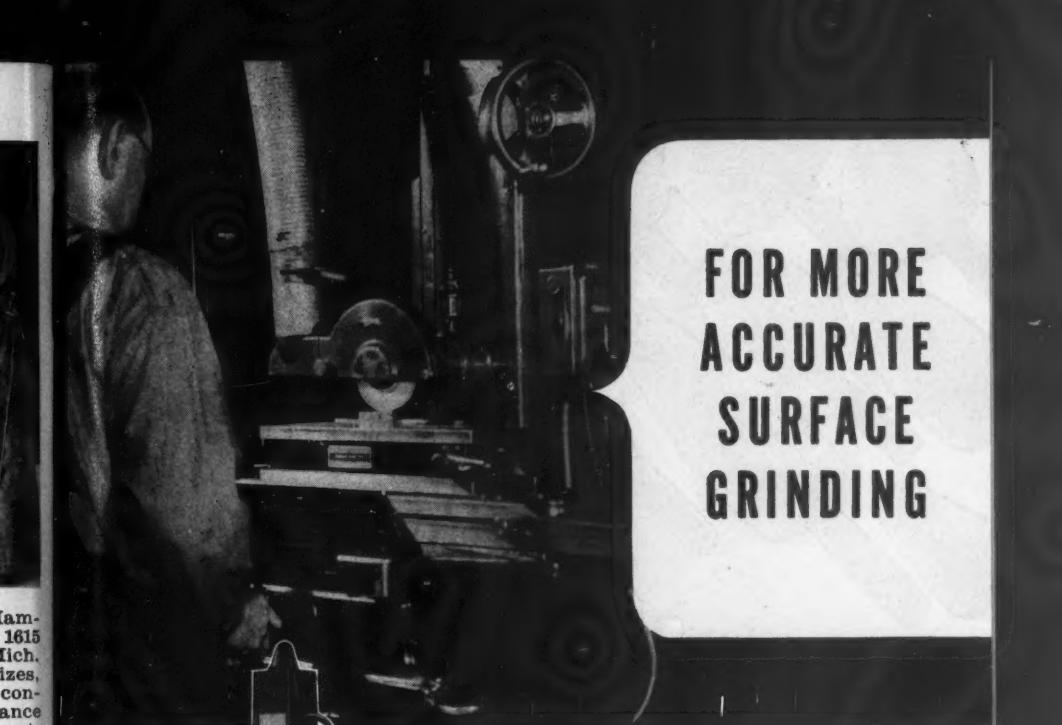
6 sizes. Capacities to 30,000 lbs.
Manual or Push Button Control



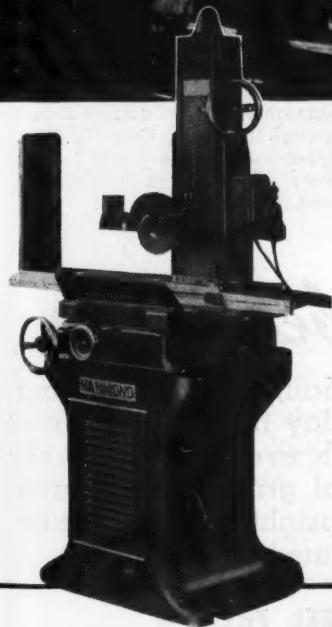
The extra strength built into C-F Positioners enables them to withstand the extreme side thrusts and torsional strains met in positioning cumbersome or unbalanced loads. . . . Coupled with the C-F pedestal mounting and adjustable height features, this extra strength increases the range of work handled, makes each C-F Positioner the most versatile tool in its capacity. You can do more work with C-F Positioners. Write for Bulletin WP-22.



CULLEN-FRIESTEDT CO., 1311 S. Kilbourn Ave., Chicago 23, U.S.A.



FOR MORE ACCURATE SURFACE GRINDING



A solid, vibrationless, smooth acting machine that will maintain extreme accuracy throughout long years of use.

KEEP UP THE SCHEDULE ★ WIN THE WAR QUICKER

★ The Hammond No. 2, 6" x 18", Surface Grinder is a precision tool room machine for use on the most accurate gauge and tool work.

The standard spindle is direct motor driven and is mounted on precision pre-loaded ball bearing. Total vertical adjustment is 10 $\frac{1}{4}$ ". In and out movement of the table is 6 $\frac{1}{2}$ " with a longitudinal travel of 18".

Prompt delivery on this machine can now be made. Write or wire for complete information.

THE FOOTE-BURT COMPANY
CLEVELAND 8, OHIO

FOOTBURT
HAMMOND
Surface Grinders

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BOTTLENECK BUSTERS

CHICAGO MOUNTED WHEELS—The first small wheels ever mounted on stationary shanks, they have maintained their supremacy through the years. Over 300 sizes, styles and grains—one to suit every job. They're tough, long lived, dependable.

America's Unbeatables

Yes, all the wheels in our line are small, but powerful and swift tools of war doing their stuff day in and day out—making it possible to speed through everything that requires precision internal or external grinding, polishing and burring—bombsights, planes, tanks, guns, intricate instruments, etc.

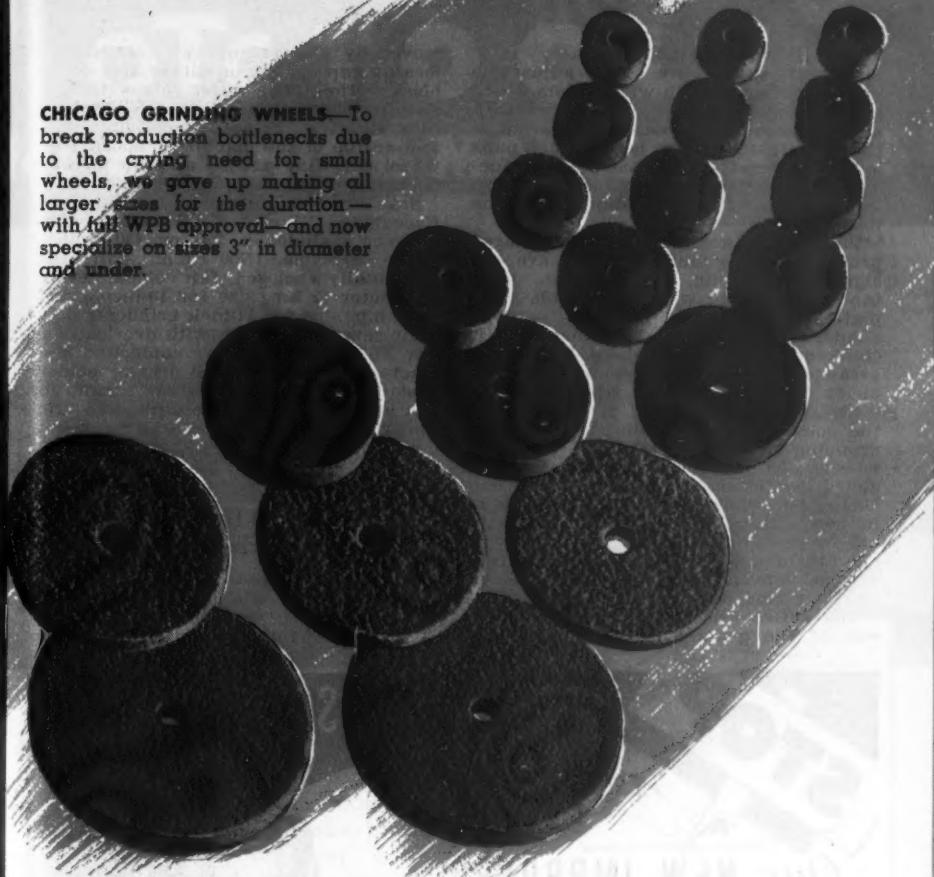


TEST WHEEL FREE —

So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

Send the Coupon for Illustrated Catalog

CHICAGO GRINDING WHEELS—To break production bottlenecks due to the crying need for small wheels, we gave up making all larger sizes for the duration—with full WPB approval—and now specialize on sizes 3" in diameter and under.



PROMPT DELIVERY—Come to America's Headquarters for Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St., Dept. MM, Chicago 7, Ill.

- Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

MM-1

Send catalog. Interested in Mounted Wheels
 Grinding Wheels Send Test Wheel. Size _____

Name _____

Address _____

ting tools while grinding wet.

Coolant spouts are fully adjustable and are provided with wide outlets which permit correct flushing of the work with a slow cascade of coolant. According to the manufacturer, new large splash pans located around the tables provide adequate protection to operators and prevent coolant from splashing onto the floor.

The tables are provided with large ground working surfaces and are designed for tilting. In addition, each table is equipped with replaceable wear plate between slot and wheel.

Additional features of the machine include new safety cup discs which are arranged so as to move in with the hoods and tables as the wheels become worn, thus eliminating, it is claimed, the possibility of operators accidentally dropping tools into the wells of cup wheels. An improved concealed swivel guard located on each wheel covers one side of the wheel while the other side is in use. This guard is said to greatly aid in providing maximum visibility to operator and to allow for complete freedom of movement of tools around the working area of the wheel.

The entire wheel guard hood at each end of the grinder may be easily re-

moved by unloosening two conveniently located cap screws on either side of the hood section. The water connections inside the hood consist of flexible hose, thus allowing the entire hood unit to be laid on top of the machine, exposing the wheel for easy access and for making necessary changes.

Standard equipment of the Hammond Redesigned "Wet-N-Dry" Carbide Tool Grinder includes a 220 or 440 volt, 3 phase, 60 cycle, 1,750 r.p.m., ball bearing, totally enclosed, fan cooled, reversing motor (2 h.p. size for 10-inch grinder, 3 h.p. size for 14-inch grinder); magnetic reversing switch with overload and low voltage protection; compound protractor tool gage; wheel dresser holder; coolant tank and motor-driven pump for wet grinding; safety cup discs, and "No-Spray No-splash" guards and pans.

"Marvel" No. 24 Universal Hydraulic Roll-Stroke Hack Saw Machine

To meet the need for a power sawing machine which will quickly and accurately cut off or trim large billets, blocks, and forgings, the Armstrong-

STOP

WANT TO SAVE TIME?

HERE IS THE ANSWER

**Our NEW IMPROVED
5 STATION LATHE TURRETS**

1 JUST A TURN AND A LIFT OF THE HANDLE
BRINGS ONE OF FIVE TOOLS IN POSITION

2 THIS, WITH TEN ACCURATE INDEXED TOOL
POSITIONS ALLOWED MINUTE ADJUSTMENTS

MADE UP IN FOUR
INDIVIDUAL SIZES

FOR LATHES FROM
9" to 30" SWING

Time saved brings VICTORY that much nearer. Our NEW IMPROVED TURRET HEADS are built to take heavy cuts, and give precision service. Inexperienced help can quickly become fast operators with these NEW IMPROVED TURRET HEADS.



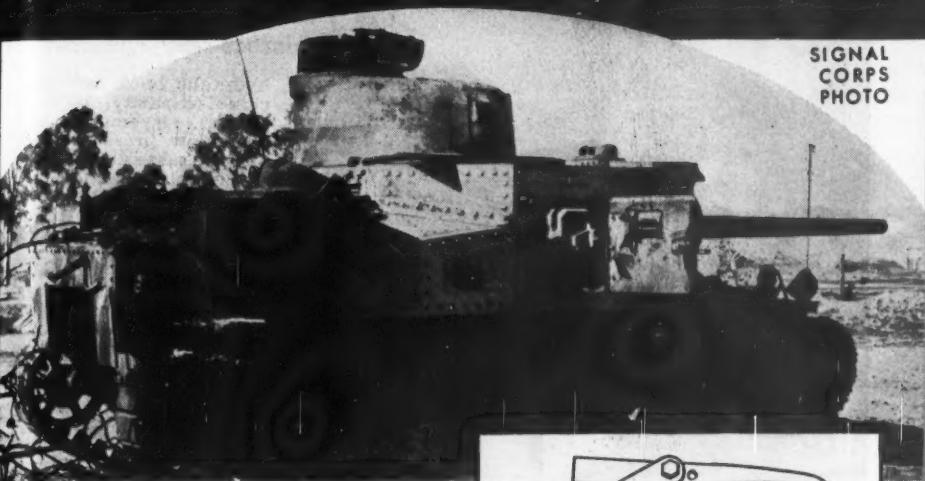
Write Today for
Complete Details

132 CHARLES STREET.

AUBURNDALE, MASS.

OTC TOOLS

for MACHINE MAINTENANCE



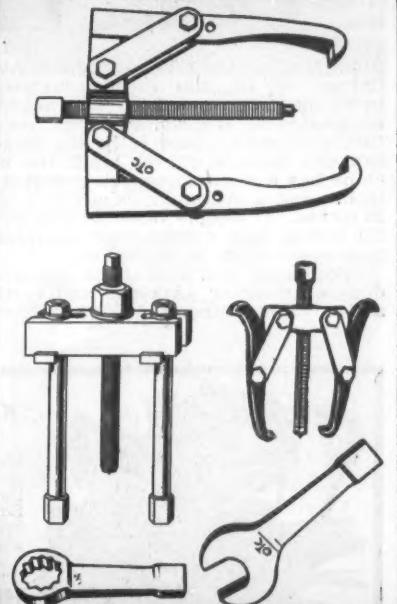
ON THE MARCH!

In this Mechanized War—tools are vital equipment. They *have* to be *good*—sturdy and efficient—sure, safe and speedy in use.

OTC Wrenches, Pullers and other Tools have met the most exacting War demands. They are serving in the Army, Navy, Merchant Marine—and in War Factories, Ship Yards and Airplane plants. Available on proper priority. Tell us your needs.



WORK FOR VICTORY



OWATONNA TOOL COMPANY
OWATONNA

MINNESOTA

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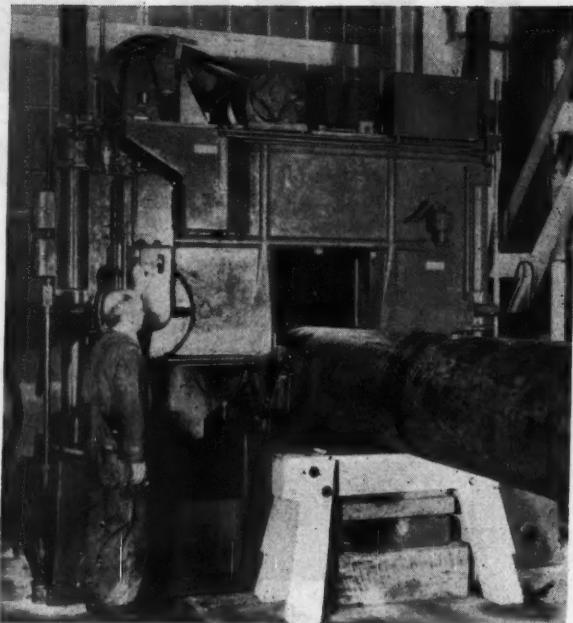


Illustration showing "Marvel" No. 24 Universal Hydraulic Roll-Stroke Hack Saw Machine being used to saw a 22-inch diameter alloy shaft

hydraulic hack saw machine (capacity, 18 x 18 inches). It employs the same low pressure feed and the same unique roll-stroke cutting action. All vital parts are fully enclosed and protected against abrasive dust and dirt, as well as rough usage. The machine uses a special blade 36 inches long, $4\frac{1}{2}$ inches wide, and $\frac{1}{8}$ inch thick, with $2\frac{1}{2}$ teeth per inch. The blade is of the unbreakable composite Marvel type, featuring high speed steel teeth and a tough alloy body.

Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill., has added a universal hydraulic roll-stroke hack saw machine designated as the No. 24 to its line of "Marvel" saws. Said to be the largest capacity hack saw ever built, the machine has a nominal capacity of 24 x 24 inches and a maximum capacity of 25 x 26 inches. It weighs 16,000 lb., measures 151 inches high overall, and occupies a floor space of 56 x 122 inches.

The Marvel No. 24 Saw is similar in design, operating principle, and cutting action to the Marvel No. 18 universal

Racine Model No. 36-C Heavy Duty Hydraulic Metal-Cutting Machine

The Racine Tool & Machine Tool Co., Racine, Wis., announces the development of a 20 x 20-inch capacity metal-cutting machine which is hydraulically controlled and operated to provide a full range of cutting feeds for the fast, accurate sawing of all metals. Designated as the Model No. 36-C, the machine is said to be particularly adaptable to the

An advertisement for Howe & Son, Inc. It features a large image of a Howe-Lindsey Automatic Saw Sharpener on the left. To the right, there is text and several illustrations of different types of saw blades, including a band saw, a slitting saw, and a hack saw. The text includes a call to action to write for a folder and the company's name and address.

DUSTKOPS STOP DUST from ALL Abrasive Operations

Entirely Self-contained. Motor, fan, cyclone separator and filter. Fast installation. Flexible metal hose permits installation complete in minutes.

Compact and Portable. Even the biggest DUSTKOPS will usually fit in the existing space behind or beside the grinder.

Send now for complete information. To save time, describe the source of the dust when you write.

A G E T - D E T R O I T C O.

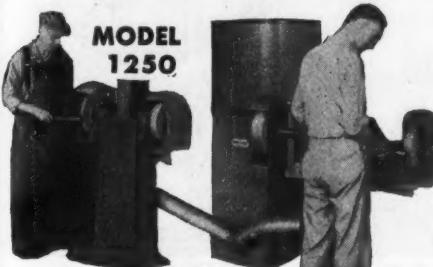
604 First National Bldg., Ann Arbor, Mich.
Detroit Office: CADillac 3090—Zone 26

MODEL 600
Spun Glass
Filter



↑ For smallest grinders, laboratory work.

**MODEL
1250**



MODEL 950
has a cyclone
separator.

↑ "READY TO GO" this model is for medium duty work of all kinds.

**MODEL
600**
has a spun
glass filter.



↑ Ideal for light duty production surface grinding.

MODEL 1250
has a cyclone separator.



↑ Handles all the dust from this armor grinding job easily.

← Four wheels exhaust into a single Model 1250 that gets all the dust.



Racine Model No. 36-C Heavy Duty Hydraulic Metal-Cutting Machine

use of a fast-cutting speed in sawing light materials and yet is arranged so as to provide for a positive predetermined rate of cutting in sawing die blocks, alloys, and tool steel. The machine is equipped with a three-speed transmission providing cutting speeds of 55, 85, and 115 strokes per minute, and is driven by means of a 3 h.p. motor through V-belts connected to the three-speed transmission by a Twin Disc clutch.

Specifications of the Racine Model No. 36-C Heavy Duty Hydraulic Metal-Cutting Machine are as follows: rated capacity, 20 x 20 inches; capacity at 45 deg., 20 x 14 inches; length of stroke, 6 inches; strokes per minute, 65, 85, and 115; blade length, 30 inches; motor horsepower (standard r.p.m.), 3; length overall (with motor), 78-90 inches; height overall, 78 inches; width overall,

cutting of die block steel and other costly materials, since the comparatively lightweight blade used removes only a small amount of metal in the form of chips.

The Model No. 36-C is fully controlled by a single lever and includes a special dual-type feed which allows for the

MOTORIZED HOPPER UNITS

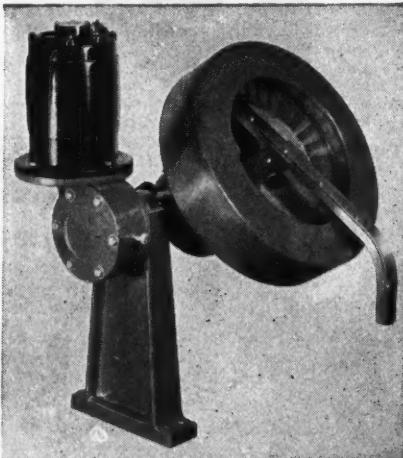
ADAPTABLE TO ANY
MACHINE.

FEED BULLET CORES,
SCREWS, PINS, WASHERS,
BEARING ROLLERS, NUTS,
RIVETS, SPECIAL PARTS.

Send Samples for
Information and Prices.

DETROIT POWER
SCREWDRIVER CO.

2807 West Fort St.
DETROIT • MICHIGAN





**Get Higher Speeds...Faster
Feeds...Deeper Cuts
WITH
SIMONDS
Inserted-Tooth Metal Saws**

High-speed steel teeth . . . with a wedge for every tooth . . . mean extra strength and sharply improved operating characteristics that in many cases have doubled metal-cutting production on billets, sheets, rods and rails. Alternating bevelled and square teeth split chips in 3

parts, and curved gullets clear them easily under heaviest loading. So chips can't weld, stick, or cause the saw to break. Teeth are readily sharpened in the plate . . . and quickly replaced, when worn out, by your own mechanics. Prompt shipments on rated orders.

Operating Handbook FREE

Handy pocket book tells how to get utmost service and production from Simonds Inserted-Tooth Saws.

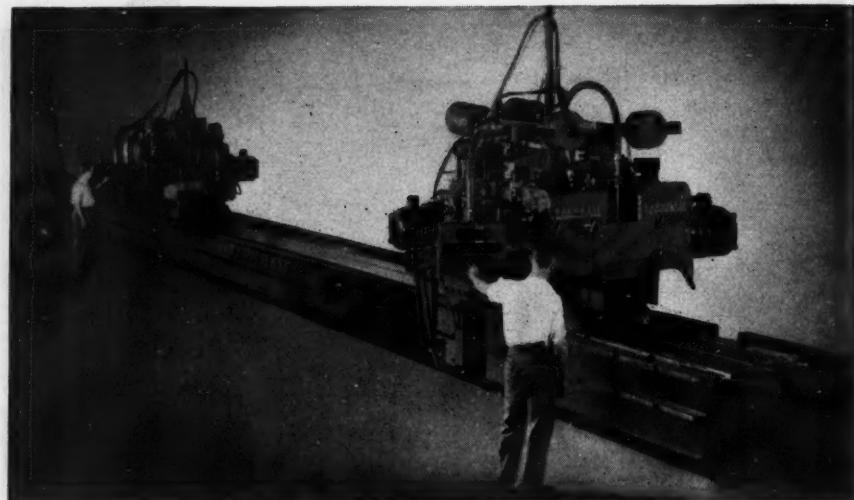


SIMONDS SAW & STEEL COMPANY
1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 520 First Ave. S., Seattle 4, Wn.; 31 W. Trent Ave., Spokane 8, Wn.

SIMONDS

Famous Family
of Metal-Cutting Tools

★ BOUGHT YOUR BONDS THIS WEEK? ★



Farnham Spar Miller

48 inches; shipping weight (with motor), 5,760 pounds.

Farnham Spar Miller

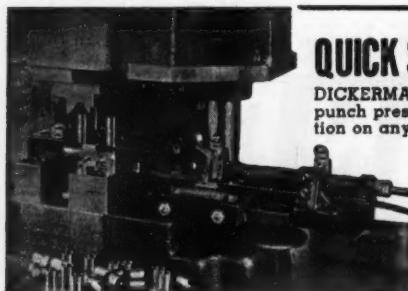
Claimed to be the world's largest spar miller, the Farnham Spar Miller shown in the accompanying illustration has been completed by the Farnham Mfg. Co., 1636 Seneca St., Buffalo, N. Y. The machine is similar in principle to other Farnham high speed spar millers now being used in fabricating spars for aircraft.

The machine has an overall length of 91 feet and a table length of 80 feet.

Two carriages having a total of six milling spindle travel the length of the bed during the milling operation. The two carriages operate independently from each other. When milling long spars, they are used simultaneously, performing as many as six operations at a time. Horsepower for the spindles ranges in three figures.

DeWalt Portable Radial Saw

A portable type radial power saw especially designed for "on-the-spot" cutting of materials is announced by DeWalt Products Corp., Lancaster, Pa.



QUICK SET-UPS ON ANY PUNCH PRESS

DICKERMAN Hitch Feeds are adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die . . . from zero to its limit (2" on 2" Hitch Feed and 4" on 4" Hitch Feed) for each stroke of the press.

Quick set-up . . . economical for short runs.

Write for Folder No. 84.

H. E. DICKERMAN MFG. CO.
321 Albany St. Springfield, Mass.



READY FOR
IMMEDIATE DELIVERY

FORD Hand-Cut FILES

If your filing problem involves any of the harder metals—cast iron, steel forgings, welds, steel dies—anything that calls for a definite filing, wearing action—the Ford HAND CUT file is your solution. And it's your IMMEDIATE solution, for your order for any standard shape and size in the hand cut line will be filled out of stock the same day it is received.

Try a Ford file—you'll find it faster cutting, longer lived—because it is made by the oldest manufacturer of rotary files in America. For nearly a quarter of a century, Ford has devoted its entire attention to the one job of making better rotary files. Send for catalog on the complete line. M. A. Ford Mfg. Co., Inc.—744 W. First St., Davenport, Ia.



FORD

the Complete Line

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1944

Your Tapping Questions

When should I use a two-flute tap?

What is meant by per cent of thread?

Is the type of cutting oil important?

How much chip clearance should I allow in a blind hole?

Which holding fixture?

How can I get more tap life?

Answered

Precision tapping is a science in itself, and even an experienced operator will occasionally run into a snag. Our engineers are trained in the field. Draw on their experience and knowledge to reach a solution to your problem quickly and easily. Write for catalog. Send your questions to R. G. Haskins Co., 620 South California Avenue, Chicago, Illinois.



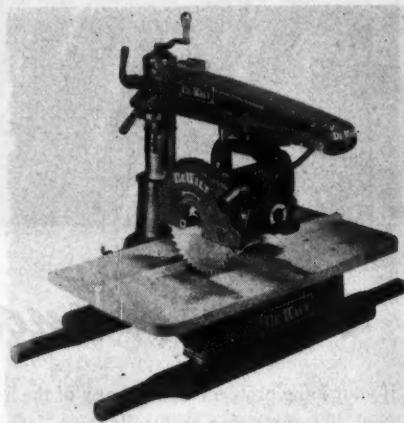
haskins

PRECISION MACHINE EQUIPMENT



Provided with two sets of handles for ease in carrying from one location to another by two men, the machine, when equipped with metal saw or abrasive wheel, can be used to cut light metals, both ferrous and non-ferrous. When equipped with a wood saw, the machine can also be used in a pattern shop.

The sturdy cantilever arm of the DeWalt Portable Radial Saw is adjustable up and down and can be swung horizontally. The yoke is designed to roll



DeWalt Portable Radial Saw

back and forth along the arm and rotates horizontally. The motor in the yoke can be tilted to any angle. Regardless of the operation being performed, the machine is said to be perfectly balanced, since the weight of the motor is always in line with the center line of yoke, arm, and column.

The DeWalt Portable Radial Saw is available in 1½, 2, and 3 h.p. sizes. The direct drive motor is of a protected type and is Formex Fiberglas insulated and provided with sealed ball bearings that require no lubrication.

Sheffield Leadcheck

A production type gaging unit for the rapid and accurate checking of quantities of threaded parts, such as aircraft components, studs, and small shafts, to be known as the Leadcheck, has been placed on the market by The Sheffield Corp., Dayton 1, Ohio. Simply but rugged

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MARVEL SAW'S

FULLY UNIVERSAL

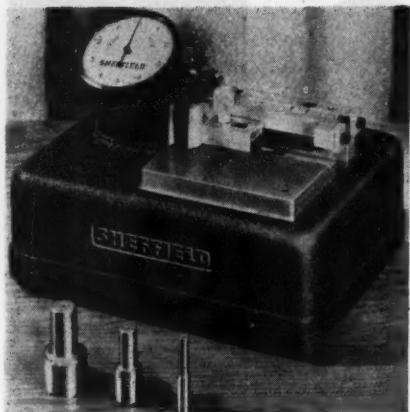
At least one MARVEL No. 8 Metal-cutting Band Saw is found in all well tooled plants to handle miscellaneous work, much of it impossible for other sawing machines. The largest capacity metal band saw built, yet equally efficient on the smallest and most delicate work, it is one of the busiest tools in the shop. Cuts-off bar steel, pipe, tubing, mouldings, structural steel; cuts-off and miters with maximum speeds and feeds—will do everything that any other metal saw will do, more conveniently, more accurately; and in addition, a vast variety of work no other metal saw will handle, such as cutting at any angle up to 45 degrees right or left without moving the work.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago 39, U. S. A.
Eastern Sales Office: 225 Lafayette St., N. Y.





Sheffield Leadchek

gedly constructed, the unit may also be used to good advantage in the receiving room or gage inspection department where quantities of identical threaded parts require checking.

According to the manufacturer, thread

lead can be very rapidly checked to an accuracy of 0.0001 inch by means of the Leadchek. The unit is designed to handle parts having diameters ranging from 0.125 to 2 inches and with threaded lengths up to 2 inches and threads as fine as 40 pitch or as coarse as $2\frac{1}{4}$ threads per inch.

The Leadchek may be obtained with a dial indicator, Electricheek or Electric-gage head. The dial indicator has a range of 0.010 inch and is graduated in 0.0001 inch.

Regent Automatic Feed Facing and Boring Head

Designated as the Regent, an automatic feed facing and boring head for use on horizontal boring bars in performing facing, outside turning and boring operations is announced by the Paper Converting Machine Co., Green Bay, Wis. The head utilizes the forward and backward feed mechanism of the boring bar itself to automatically outwardly or inwardly feed the toolholder slide, thereby providing a wide range of cuts for roughing and finishing operations.

Hartford

"S U P E R S P A C E R "

The Hartford "Superspacer" can easily be set up for one piece or thousands. Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12 and 24.

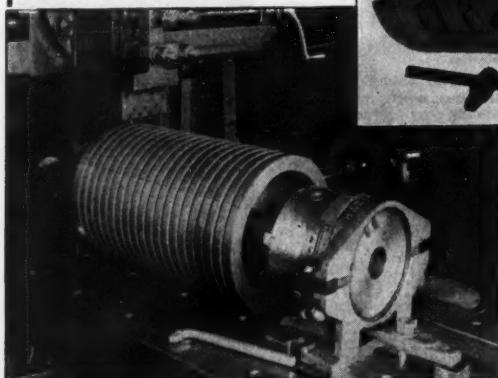
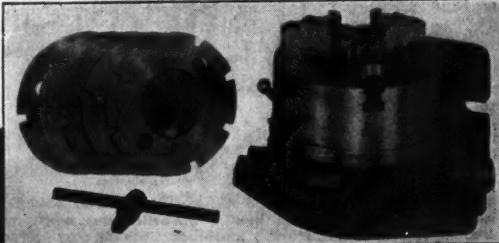


Illustration at left shows an unconventional but simple and logical set-up for planning the graduation lines on cast iron drums. This and other similar work can be done in but a fraction of the time formerly required by milling.

Write for folder

**THE HARTFORD
SPECIAL MACHINERY CO.
HARTFORD • CONNECTICUT**

BUILT by PERFECTIONISTS for Exacting Operations!



CIRCLE R
Metal Cutting
Saws . . . and

The Famous
GRUMMAN HELLCAT

Circle R Saws and
Grumman Hellcat fighters
have this in common; both
are made by perfectionists
to accomplish today's diffi-
cult and exacting tasks.

CIRCULAR TOOL CO., Inc.

PROVIDENCE 5, RHODE ISLAND

CHICAGO • PHILADELPHIA • NEW YORK • DAYTON • CLEVELAND
LOS ANGELES • ROCHESTER • INDIANAPOLIS • DETROIT • ST. LOUIS

The head is designed for bolting to the spindle face of the boring bar and, according to the manufacturer, is so

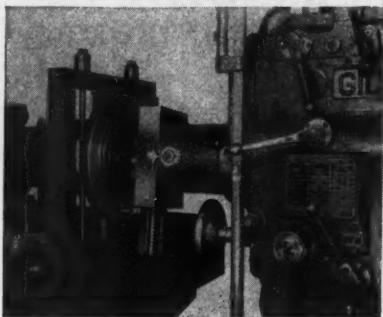


Illustration showing Regent Model 20 Automatic Feed Facing and Boring Head in use on step-facing job.

ruggedly constructed that it will take almost any cut the bar itself will withstand. Micrometer feed adjustment is incorporated in the toolholder for fine finish cuts.

The Regent Automatic Feed Facing and Boring Head is available in two models; namely, Model 10 with range from 0 to 12 inches diameter and Model 20 with range from 0 to 24 inches diameter. Special toolslides for diameters up to 18 inches can be used on the Model 10, while on the Model 20, special toolslides for diameters up to 36 inches may be employed. Larger heads can be made to order.

Peck & Harvey Table-Type Continuous Printer

A sturdy built table-type printing machine for the continuous production of sharp blueprints or black-and-white prints is announced by Peck and Harvey, 4327 Addison St., Chicago, Ill. Readily portable, the machine is designed for plugging into any standard electric outlet and is said to be unusually easy to operate and maintain.

In use, any drawing, tracing, or printed matter up to 44 inches wide (or as many as five 8½ x 11-inch sheets) may be fed into the machine. According to the manufacturer, prints of any length

NEW!

MODEL SP400

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"They Pump Air"

Through clever application of the fundamental principle of Patent No. 2,164,869, these pumps are simple in design, thoroughly dependable and instantly self-priming on normal suction lifts encountered with machine tools. Model SP400 is sturdily built, with all the superior BRADY-PENROD features, to handle abrasives and steel chips. Easily installed on present machines or quickly adapted to new machines.

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and close collet.

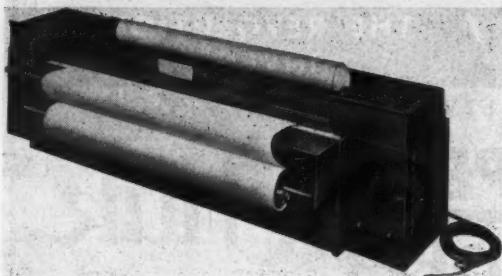


GENERAL DIE-STAMPING-TOOL COMPANY

PRECISION COLLET DIVISION

265 Canal Street, New York 13, N.Y.

Peck & Harvey Table-Type
Continuous Printer



can be continuously made at speeds up to 42 inches per minute without side travel, blurring, or wrinkling.

The Peck & Harvey Table-Type Continuous Printer is available in two models; namely, Model "B-1" having a single horizontally mounted Cooper-Hewitt mercury vapor tube lamp which is said to provide uniform light intensity overall, and Model "B-2" having two horizontally mounted Cooper-Hewitt lamps. The unit is equipped with a special super-clear hand polished contact glass and sliding contact to ensure clear overall exposure, and is driven by means of a quiet-operating, ball bearing equipped,

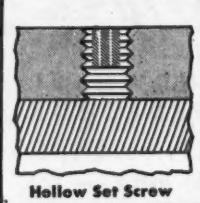
variable speed motor coupled to a ball bearing mounted geared head through non-slipping positive-drive sprockets and silent-type chain. The machine is provided with a wide range of speeds which are controlled by a constant current rheostat.

The Peck & Harvey Continuous Printer is 16 inches wide x 16 inches high x 63 inches long overall and is finished in durable olive green wrinkle baked enamel.

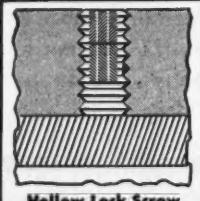
Detroit Improved LTM Light Duty Tapping Machine

An improved LTM light duty lead screw type tapping machine for precision production tapping has been announced by Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich. The machine has a capacity for tapping holes up to $\frac{1}{8}$ in.

DESIGNED FOR Safety... BUILT FOR Strength



The natural advantages of hollow set screws include safety on revolving or moving parts, ease of assembly in confined places, and more compact construction.



The tremendous holding power of Mac-it Hollow Set Screws makes locking devices unnecessary in all but a few applications. In these cases, Mac-it Hollow Lock Screws are used like jam nuts to prevent any possibility of loosening.



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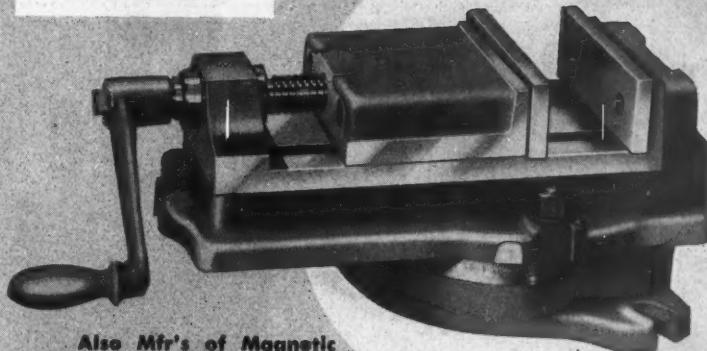
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Swivel MILLING MACHINE Vises

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DELIVERY



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Chucks, Demagnetizers,
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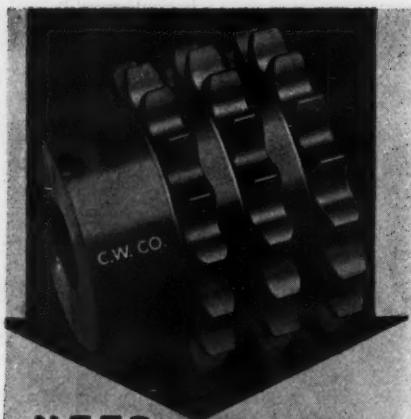
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MASTER
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6 1/2" SIZE
\$32.55**

Suitable for milling machines,
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these large semi-steel vises
may be used plain or swivel.
The steel jaws are sturdy.
Key slots provide for attach-
ment to machine table hold-
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angle or parallel to table.
Junior 4 1/4" size, \$23.60
45 pounds.....

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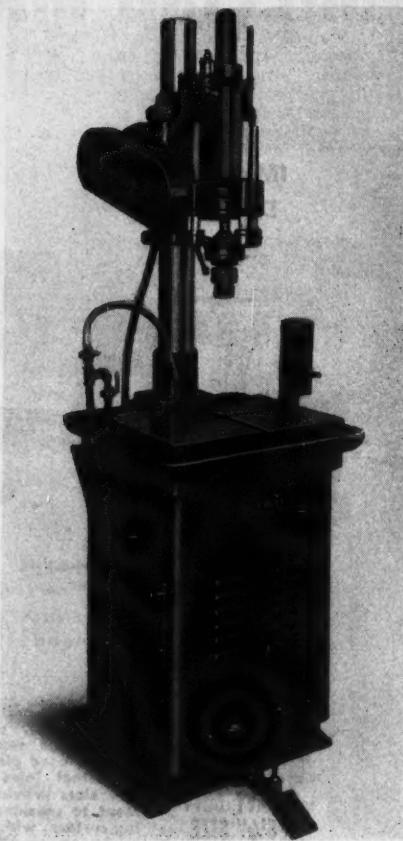
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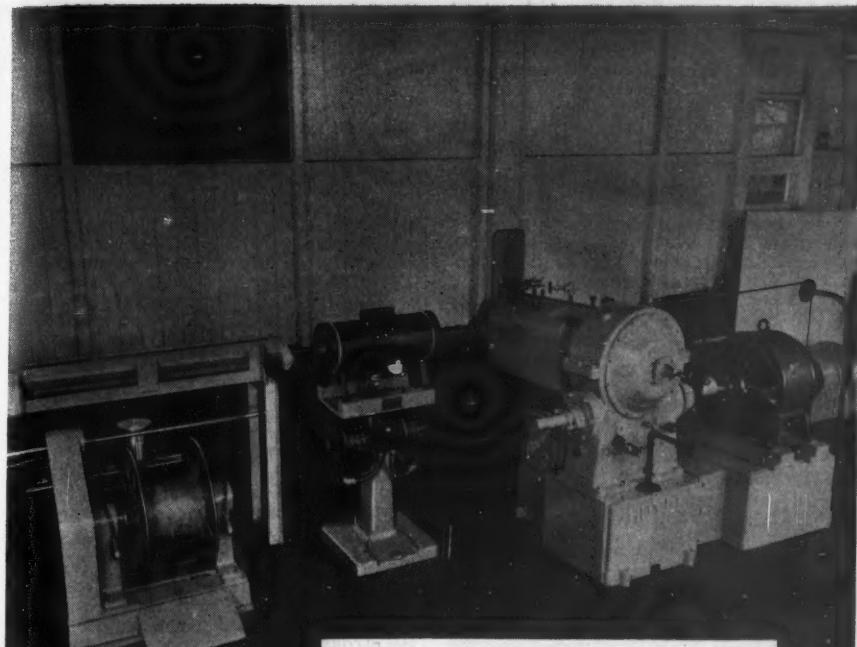
inch diameter and 14 pitch in mild steel.

Increased accuracy is one of the principal features claimed for the improved unit. Sturdy guide rods control the tapping spindle throughout the entire length of its stroke. The movable head, in turn, guides the driving end of the tapping spindle. Further assurance of ac-



Detroit Improved LTM Light Duty
Tapping Machine

curacy, especially in tapping deep holes, is said to be obtained by driving the tapping spindle at a point between the tap and the lead screw itself, thus eliminating the necessity for the lead screw to drive the tap. This feature, according to the manufacturer, precludes the possi-



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localized heat in their pro-
cess of making high qual-
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HEVI DUTY ELECTRIC COMPANY

LABORATORY FURNACES

bility of inaccuracies caused by lead screw "wind-up."

The lead screw and bronze lead nut are of the interchangeable type and may be removed as a unit by removing the dust cap and one screw. The lead screw is of high speed steel, hardened and ground all over, including the threads. The two-piece bronze lead nut can be easily adjusted to take up wear and eliminate backlash.

The tapping head and motor may be raised and lowered by a rack and pinion operated through worm gearing to accommodate work of varying heights and may also be adjusted horizontally

through an arc of approximately 90 deg., thus making it possible to tap work at different positions on table or fixture. Multiple tapping heads may be used.

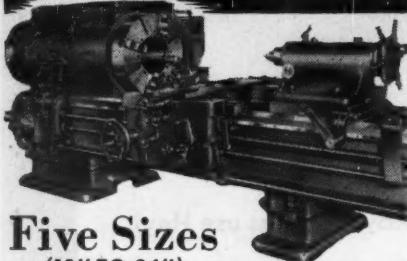
The standard table is square and is provided with T-slots. A rotary indexing type work table 15 inches in diameter is available as extra equipment. Pedal control is provided.

The Detroit Improved LTM Light Duty Tapping Machine is equipped with V-belt drive including interchangeable pulleys which allow for changing of spindle speeds. Standard spindle speeds are 64, 160, and 400 r.p.m. Pulleys for other combinations can be supplied on order. The motor is adjustably mounted to facilitate belt changing and adjustment. The drive includes a friction clutch of the multiple disc type which may be set by hand control to any desired degree of operating tension—a feature which is said to provide for reduction in both tap breakage and rejects.

The tapping cycle is controlled by limit switches. The trip dogs which contact the limit switches are adjustable to any desired length of tapping stroke within the limits of the machine. A push button is used to start the machine, at which time the spindle travels to the bottom of its stroke, automatically reverses, and stops at the top of its stroke. Emergency stop and reverse push buttons provide full control. This push-button panel is conveniently located near the operator's hand, and the stop button is fitted with a safety lock. Anti-friction bearings are used throughout.

HYDRATROL LATHES

Large Hollow Spindle Type



Five Sizes

(18" TO 36")

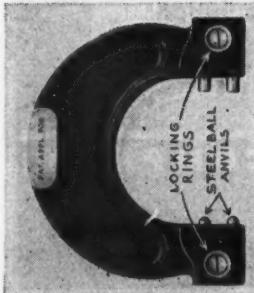
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Bell B-90-Degree Angle Head Tool

An angle head tool which, due to an unusual miter gear design, is said to possess great internal strength and,



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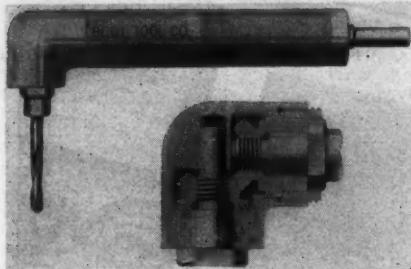




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The right tool for every job means *more power for your man power* . . . plus greater speed and better workmanship! With the increasingly critical labor shortage there is now no place for obsolescent tools, "slow" tools, or tools poorly adapted to the job. Fast, flexible and accurate, modern Snap-on tools are giving added efficiency, modern power in countless maintenance, production and assembly operations. Snap-on tools are distributed through 35 factory branches located in key production centers. Write for catalog and address of the nearest branch.

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Bell B-90-Degree Angle Head Tool

therefore, long operating life, to be known as the Bell B-90-Degree Angle Head Tool, is now being offered by the Bell Tool Co., 710 W. Jackson Blvd., Chicago 6, Ill. As shown in the accompanying illustration, the sleeve of each miter gear provides a very large bearing surface to maintain the initial true alignment of spindles and gears over long periods of operation.

The Bell B-90-Degree Angle Head Tool is designed for use with flexible shaft machines and other small portable tools, and will accommodate adapter-mounted bits for drilling, burring, reaming, coun-

tersinking, rotary filing, and light grinding. Due to its small overall size—1½ inches high x 5¾ inches long including power receiving shaft—the tool is said to be ideal for use in "close quarter" production operations where space for tools is limited. According to the manufacturer, the light weight of the tool allows for its use with a minimum of operator fatigue.

Connecticut Universal Filing Machine

Designed for dies, die shoes, fixtures, punches, stripper plates, forging and drawing tools, templates for aircraft and other precision work, gages, cams, and general precision machine work, the Connecticut Universal Filing Machine shown herewith has been brought out by the Connecticut Tool & Engineering Co., 544 Iranistan Ave., Bridgeport, Connecticut.

Arranged for performing filing operations on any angle up to 20 deg., the machine is equipped with a vari-drive motor with infinite speed regulations, and can be stopped and started by means of a foot pedal switch built into the base.

"TIME SAVER"

Improved holder with interchangeable steel type
makes part number changes a simple operation.
Turn a screw to make the change.
...Guaranteed for years of service.
Used by hand or press, it's a time
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This job called for calibrating 600 expensive dials. Extreme accuracy and minimum waste were essential. We estimated the job would take a full year for engraving!

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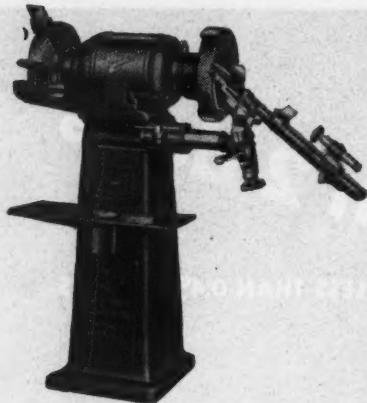
roller stamping die that turned the job out in less than 2 days! 598 out of the 600 dials passed the rigid inspection. Our customer saved both time and money. Let us duplicate this saving on all your marking requirements.

SOSSNER

161 Grand Street, New York 13, N. Y.

January, 1944

TAPS	CUTTING TOOLS
STEEL STAMPS	GAGES



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A Drill Grinder which grinds drills correctly is literally worth its weight in high speed steel. Incorrectly ground drills are subject to undue wear and breakage. In grinding drills by hand more steel is ground away than is actually used in drilling holes.

Hisey Drill Grinders made in four sizes will grind drills from No. 60 to 2½ inches. They will grind straight or taper shank drills with 2, 3 or 4 flutes; also chucking drills and flat or flat twisted drills and drills with oversize shanks. Larger sizes have adjustment for varying cutting angle and point angle.

Machines can also be furnished with pump and pan for wet grinding.

NEW CATALOG !

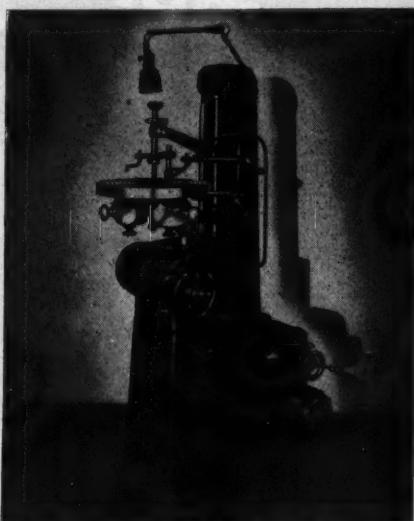
Complete new Catalog No. 70AM is now on the press. Several new items have been added and others redesigned. Write for your copy now.

Hisey Drill Grinders are guaranteed to grind drills with correct point for most efficient drilling of metals and other materials. Drills are handled in V ways and do not depend on center holes.

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CINCINNATI, OHIO

thus allowing operator free use of both hands at all times. The crank drive is completely enclosed in an oiltight housing for long life, and reciprocating parts are hydraulically balanced. Handwheels have been specially designed to provide ample hand and finger convenience.

The main spindle of the Connecticut Universal Filing Machine is of an extremely rigid ball bearing type which transmits all the forces from the crank drive directly to the frame of the machine. Main guide bushings are hard-



Connecticut Universal Filing Machine

ened, ground, and lapped, and every movable part is bath-lubricated.

The table surface is ring fluted for easy elimination of file dust and is arranged so as to be in perfect alignment with file holders at all times. The table can be tilted in any direction by means of a cradle and rocker arrangement which is operated by means of rack and pinion. The vernier scales provided are graduated for precision accuracy and can be read up to ten minutes directly. Since the table is said to be perfectly balanced, it can be readily raised or lowered by means of a finger spin of handwheel. Two hold-down arms and fingers, which may be adjusted and swiveled in any direction, hold the work flat and firmly on the table.

Another feature of the Connecticut Universal Filing Machine is an air pump

NEBEL Geared Head Lathes

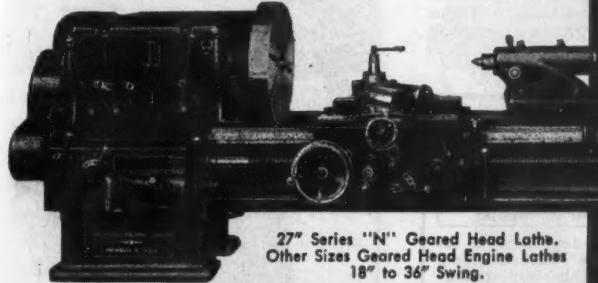
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The only Sweep with DOUBLE CAM ACTION that incorporates Synchronized Stroke, R.P.M., and Length of Sweep.

Puller Bracket (attached to ram) protects operator from breakage, accidents, repeats, or wilful negligence.

ADJUSTABLE . . . REVERSIBLE . . . and "tailor-made" to fit press dimensions.

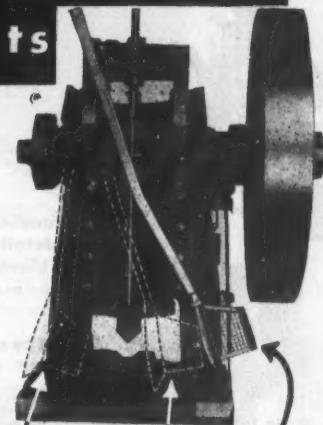
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STRAND MFG. CO.

Safety Engineers

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Arm completes sweep with a slight downward movement of the ram.

Starting point of sweep can be set as close to die as the job requires.

Sweep Arm travels ahead of the ram. Operator cannot work around gear.

which delivers a strong, continuous blast of air, independent of machine speed, directly to the work through an adjustable hose and jet.

Specifications of the machine are as follows: stroke, 0 to 5 inches; size of throat, 10½ inches; maximum thickness of work, 4½ inches; diameter of table, 17 inches; amount table can be tilted in any direction, 20 deg.; length of files, 4 to 10 inches; speeds available, infinite; strokes per minutes, 75 to 300; motor, ½ h.p. 1,800 r.p.m.; overall dimensions, 45 x 45 x 66 inches; weight with motor, 800 pounds.

GRAY TURRET HEAD METAL CUTTER OR NIBBLER

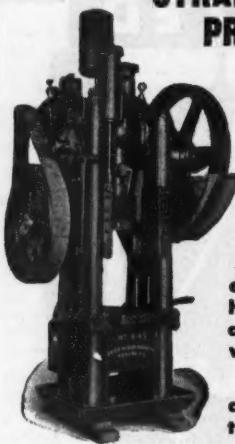


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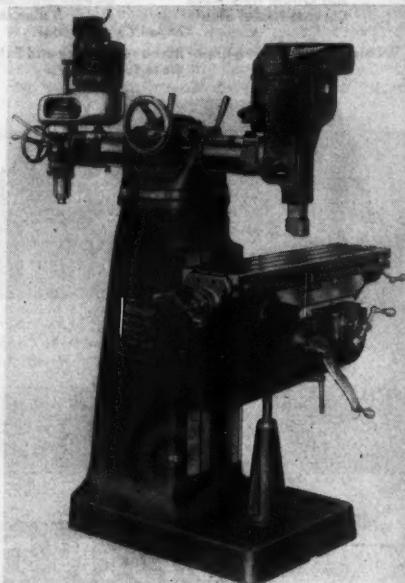
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Bridgeport Shaping Attachment

A shaping attachment primarily de-
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Turret Millers for use in performing in-
tricate shaping or slotting operations at

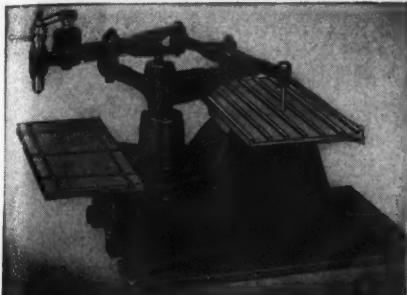


Bridgeport Turret Miller Equipped with
Shaping Attachment

all angles is announced by Bridgeport
Machines, Inc., 52 Remer St., Bridgeport,
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means for adjusting the stroke from 0 to
4 inches and is provided with six shap-
ing speeds ranging from 70 to 420 strokes



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CO.

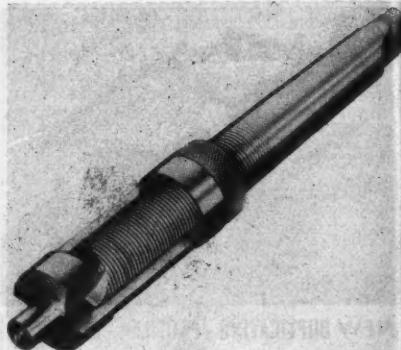
661 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

per minute.

The accompanying illustration shows the shaping attachment mounted on a Bridgeport Turret Miller in connection with milling unit. By means of this arrangement, milling, drilling, boring, and shaping operations can be performed in a minimum of time since either the milling unit or shaping attachment may be quickly indexed over the table to machine workpieces as desired. Adapters are available for mounting the shaping attachment on all other makes of milling machines.

Nash-Zempel Spot Facer and Counterboring Tool

Nash-Zempel Tool Division, J. M. Nash Co., 2354 N. 30th St., Milwaukee, Wis., announces a combination spot facer and counterboring tool with cutter that can be quickly removed for sharpening by simply loosening a knurled nut and cone nut and slipping the cutter back out of the bar. After sharpening, the cutter may be replaced in the bar where it is automatically and accurately centered when the cone is tightened down and the knurled nut locked. Exact location is obtained by



Nash-Zempel Spot Facer and Counterboring Tool

the web in the body which locates the fingers of the cutter, and the cone nut which centers the rear of the cutter on a straight line with the bar.

The pilot of the Nash-Zempel Spot Facer and Counterboring Tool is tapped for a screw which holds bushings for various sizes of drilled holes. The body and cone nut of the tool are always

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(TRADE-MARK) CEMENTED CARBIDES

Work 10 times longer between sharpenings



Carboloy-tipped scrapers speed up your scraping operations—eliminate all tendency to scratch or dig in—and last at least 10 times longer than steel scrapers. Only a few seconds required for resharpening, using a diamond wheel. No hand stoning required. In recent independent tests at a leading research institute, covering all materials scrapeable, Carboloy-tipped scrapers averaged 75 sq. in. per sharpening as against 6½ sq. in. with steel scrapers.

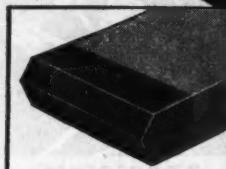
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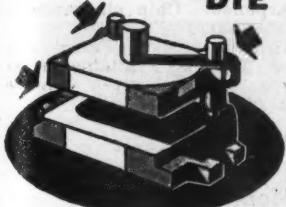
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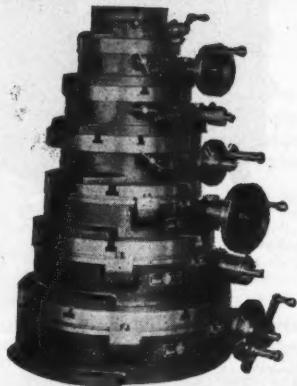
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DANLY PRECISION DIE SETS

Troyke Rotary Tables

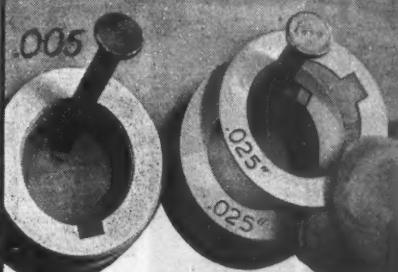


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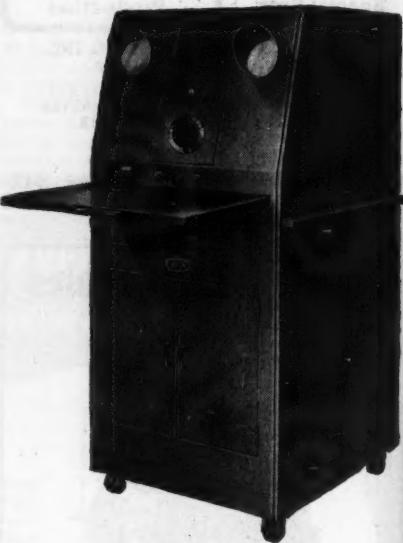


smaller than the outside diameter of the cutter, and the cutting edge of the cutter is said to remain in the same relative position no matter how often the cutter is sharpened. Chip clearance is provided in the bar.

The Nash-Zempel Spot Facer and Counterboring Tool is available in 41 standard sizes. Special sizes can be made to suit requirements.

DuMont Cyclograph

Product of Allen B. DuMont Laboratories, Inc., Passaic, N. J., the DuMont Cyclograph shown herewith is an electronic device which is designed to per-



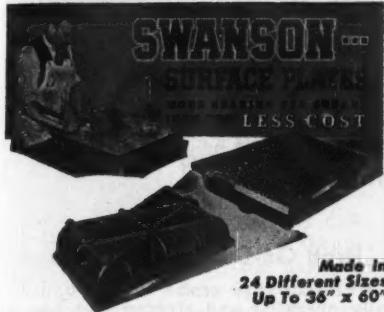
DuMont Cyclograph

form both qualitative and quantitative metallurgical tests on either ferrous or non-ferrous metals and is adapted to facilitate the checking, evaluating, and sorting of such materials according to their metallurgical properties. It is said to operate equally well for average plant personnel or laboratory technicians.

The DuMont Cyclograph utilizes the principle that the metallurgical properties of the piece under test cause variations in the core loss of a tuned pickup

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Swanson Tool & Machine Corporation
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coil which surrounds the piece. These variations affect the shape of an easily interpreted visible pattern or cyclogram displayed on the cathode-ray tube indicator screens. By means of these pattern variations, the operator readily determines differences in metallurgical properties of a number of ostensibly similar parts. In the same manner, these cyclograms can facilitate the incoming inspection of bars or other forms of stock, in metallurgical terms.

In addition to checking and evaluating, the DuMont Cyclograph can also be adapted to sorting, either manually by visual inspection of corresponding cyclograms, or automatically. The automatic sorting feature is said to be invaluable where large quantities of pieces are involved, such as in actual production-test routine. Such automatic sorting is done accurately and at high speed. According to the manufacturer, the Cyclograph provides the necessary control current for actuating relays and solenoid-operated mechanical sorting mechanisms.

The DuMont Cyclograph features a steel cabinet which is locked and sealed to prevent inexperienced tampering with the electronic mechanism. Special controls are located behind a locked panel, the key being retained by the local tech-

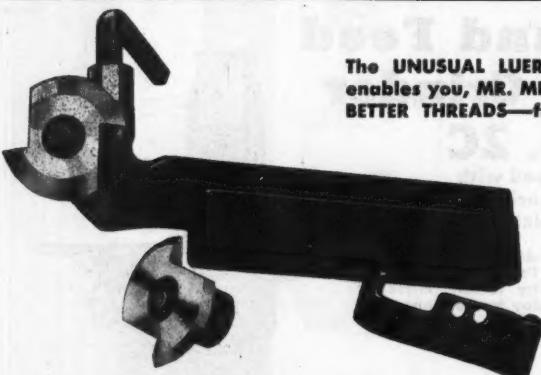
nician familiar with the setting of the unit for different kinds of materials and readings. The cabinet has a desk shelf as well as a drawer for accessories and writing equipment. A cupboard below holds spare tubes, coil boxes, cables, and other items.

Specifications of the DuMont Cyclograph are as follows: height, 51 inches; width, 37 inches; depth, 28 inches; average weight, 350 lb.; power consumption, approximately 250 watts; power source, 110 volt 60 cycle a.c.; cathode-ray tubes, 2 standard DuMont 5-inch diameter tubes.

Drott Go-Devil Tractor Crane

A tractor type crane that is hydraulically operated and steered and has unusual traction characteristics which enable it to be effectively used indoors or outdoors for lifting, loading, transporting, and unloading operations is announced by Hi-Way Service Corp., 3841 W. Wisconsin Ave., Milwaukee 8, Wis. The unit, which is known as the Drott Go-Devil Tractor Crane, is said to be ideal for loading and unloading cars, trucks, airplanes, and so on.

Large pneumatic rear tires coupled



The UNUSUAL LUERS Patented Threading Tool
enables you, MR. MECHANIC, to chase threads—
BETTER THREADS—from 25% to 50% FASTER.

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MODEL B



MODEL C

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Turnpike and Pequannock
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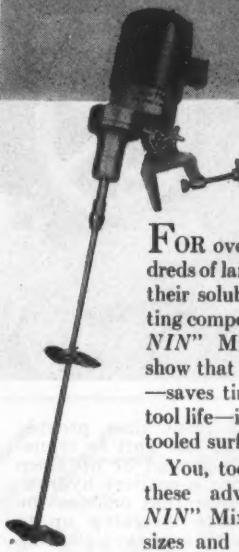
Keep down your gage
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Also: Flat and Cylindrical Plug Gages,
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and many other types
of gages.

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Pequannock, N. J.

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FOR over twenty years hundreds of large plants have mixed their soluble coolants and cutting compounds with "LIGHTNIN" Mixers. Their records show that it pays big dividends—saves time—vastly increases tool life—improves the finish of tooled surfaces.

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Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave. Chicago, Ill.



MIXING EQUIPMENT CO., INC.
1048 Gerson Ave. Rochester 9, N. Y.

Drott Go-Devil Tractor Crane



with oversize solid front tires provide traction that permits the unit to transport loads over soft ground or up steep inclines. The unit has a positive hydraulic up and down power that enables the boom to handle loads weighing up to 2,000 lb. Outriggers prevent the unit from tipping under the heavier loads.

Power-hydraulically steered, the Drott Go-Devil Tractor Crane, according to the manufacturer, may be turned under all conditions with loaded platform without effort on the part of the operator. All controls are located within easy reach of the operator's seat.

The boom swings a full 360 deg., has an extension to 90 inches, and reaches

to a height of 14 feet 2 inches. The outfit has a 10½ foot turning radius and traveling speeds up to seven miles per hour. The platform provides a loading space of 20 square feet.

A hoist worm and wheel lock arrangement is used for all lighting and swinging operations. Starting and stopping of the unit are said to be smooth and instant. Pusher plates and drawbars at both ends of the unit enable it to be also used for pushing and towing operations.

The Drott Go-Devil Tractor Crane is powered by a four-cylinder 16 h.p. gasoline engine and is available in various platform sizes, boom lengths, and heights.

Porter-Cable Model ABS Backstand Idler

As a new addition to its line of abrasive belt grinding equipment, The Porter-Cable Machine Co., 300-10 Wolf St., Syracuse 8, N. Y., announces the Model ABS backstand idler shown herewith which can be used to readily adapt grinding and polishing lathes (jacks) to endless belt grinding, thus providing for the unusually fast, easy, and ideal finishing of metal products. The idler is designed to accommodate endless metal-cutting abrasive belts up to 6 inches in width and is

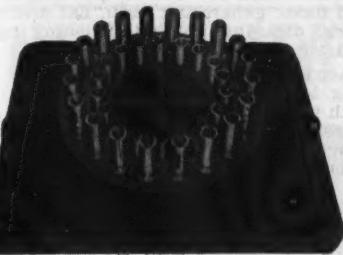
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GROBET Swiss Files

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GROBET FILE CO. OF AMERICA, 421 Canal St., New York 13, N. Y.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT.

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971 E. 8 MILE ROAD HAZEL PARK, MICH.

DO YOU KNOW THAT "CHAMPION" DIAMONDS ENABLE YOU TO DO FASTER AND MORE ACCURATE TRUING AND DRESSING OF GRINDING WHEELS?

Every month more and more Champion diamond tools are being used for exacting fast work on grinding wheels.

Feel free to write us for full information regarding this trend...and how Champion diamonds can fit into YOUR picture.

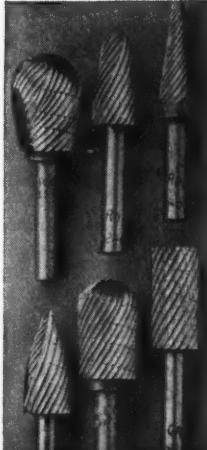
Send for our NEW Folder Catalogue

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15 YEARS EXPERIENCE

DIAMOND COMPANY - NEW YORK

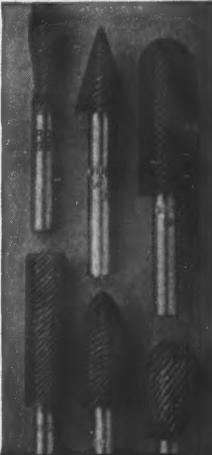
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New York, 13 N. Y.

MFRS. OF GROBET ROTARY FILES

**Capewell
HACK SAW BLADES**

**Cut Time for
Tool Manufacturer
Doing War Work**



This manufacturer had difficulty finding a blade that would take the punishment of his high-speed production — six pieces of $3\frac{1}{2}$ " steel stock at a cut, 135 strokes. Then Capewell's Technite hack saw blade was tested. The result: orders and repeat orders. Have you investigated Capewell hack saw blades?

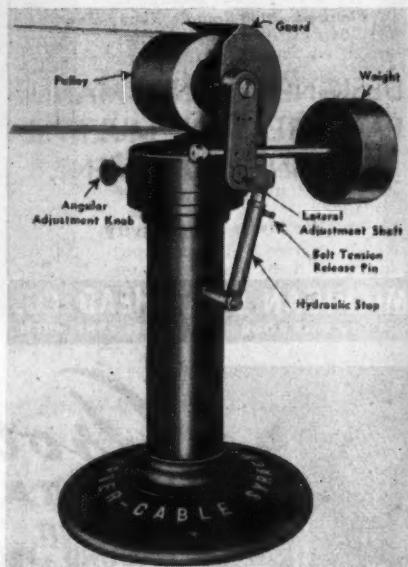
THE CAPEWELL MFG. CO.
Hartford, 2, Conn.

The trend is to Capewell's TECHNITE — the molybdenum high speed hack saw blade

CAPEWELL
HACK SAW BLADES

recommended for use in grinding welds and flash, generating radii; flat and edge work, cleaning up and polishing parts, and so on.

According to the manufacturer, the long length of belt which can be used with the Model ABS backstand idler provides for the rapid dissipation of heat generated during grinding operation, thus preventing discoloring or burning of piece being ground. The idler is equipped with a hydraulic safety device which is said to prevent the belt ten-



Porter-Cable Model ABS Backstand Idler

sion weight from exerting too great a pressure on the belt when starting, thus eliminating belt breakage and providing for smoother belt operation. By simply rearranging four parts, the idler can be adapted for right or left-hand operation.

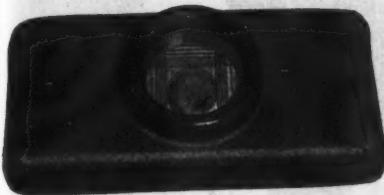
Specifications of the Porter-Cable Model ABS Backstand Idler are as follows: height overall, $41\frac{1}{2}$ inches; height to center of idler pulley, 35 inches; diameter of idler pulley, $8\frac{1}{4}$ inches; width of idler pulley, $6\frac{1}{2}$ inches; diameter of base, 22 inches; width overall, 24 inches; length overall, 26 inches; lateral adjustment to line with drive pulley, $2\frac{1}{2}$ inches; maximum distance required from center of pulley for freedom of

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• Shaft
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"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
5 1/2" x 12" 3 1/2" x 6"

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In Accordance to A.G.D.

Single End—Double End Plugs
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minor diameters.

Split Adjustable or Solid
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(Catalogues Not Available)

- Sizes of
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10" dia.

- Sizes of
rings
from 7/8"
to 8" I.D.

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THE NEW Precision LEVER TYPE CROSS-SLIDE

- Equipped with sensational tool leveling adjustment
— Maintains tool in absolutely horizontal position.

A sturdily constructed job, the Precision Lever Type CROSS-SLIDE has a capacity of 2 1/2". Built into it are many important features not usually found in a single unit . . . Three separate models fitting ATLAS, LOGAN, 9" SOUTH BEND Lathes. Can also be adjusted to any other bench lathes.



Your dealer can supply you with the new Precision lathe attachments. Also ask him for Precision Collet Models 3AT, 3C, 5C, 480 (Same as W. & S. No. 1) — and Handwheel and Lever-Type Drawbars . . . for Atlas, Logan, South Bend Lathes and many others.

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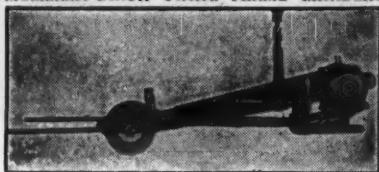
GENERAL DIE - STAMPING - TOOL COMPANY
PRECISION COLLET DIVISION, 265 Canal Street, New York 13, N.Y.

weight movement, 13 inches; speed, balanced to 10,000 surface feet per minute; net weight, 265 lb.; shipping weight, 345 pounds.

Leiman Portable Dust Collector

A portable type dust collector which is not only said to provide an unusually powerful air suction to draw the dust away from the point of origin but for efficient dust separation as well is now being offered by Leiman Bros. Inc., 168

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 12", 14", 16", 18", 20" and 24" wheels.

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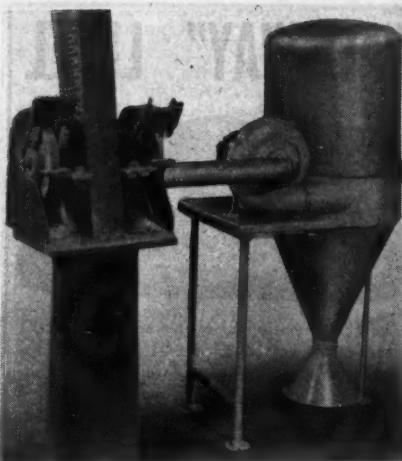


Illustration showing Leiman Portable Dust Collector connected to double-wheel grinder

Christie St., Newark 5, N. J. The unit is designed to include ample space for expansion of the air inside the system to slow down the air current, thus allowing the dust particles to drop away into a compartment for disposal.

Reasonably compact to permit it to be easily moved from one location to another, the Leiman Dust Collector can be used with machines having one or two grinding wheels or buffs, also with sawing machines, belt sanders, and other machines. The unit requires no outside piping connections and can be readily set up where desired.

The Leiman Portable Dust Collector occupies a floor space of approximately 20 x 30 inches and is available in sizes ranging from $\frac{1}{4}$ horsepower.



Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

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WHEELS AND POINTS

The World's Best Rubberized abrasives for
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Attach this advertisement to your card or
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sample. Or if you prefer send \$1.00 for
Special 33 wheel assortment.

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DORMAN TAPPERS

friction or
positive drives.

FEATURES:

Self centering floating chuck jaw, extra wide range for each size tapper, precision construction.

No. 1 Tapper friction or positive drives 2-56 to $\frac{3}{8}$ " tapers in steel or any other material. No. 2 positive tapper drives $\frac{3}{8}$ " to $\frac{5}{8}$ " tap in steel or any other material and No. 3

drives $\frac{1}{2}$ " to 1" in steel or any other material.

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**Counterbores
High Speed
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TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{2}$ " to 1"	\$12.00
2A	1" to $1\frac{1}{2}$ "	16.00
3A	$1\frac{1}{2}$ " to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



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Are Available to Shops
Using Modern, Versatile**

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M A N D R E L S
W. H. NICHOLSON & CO.
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TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

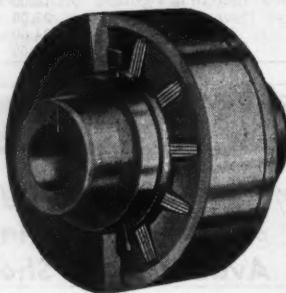
Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{2}$ " to $\frac{1}{4}$ "	\$10.00
2X	$\frac{1}{2}$ " to $2\frac{1}{3}$ "	11.00
3X	$2\frac{1}{3}$ " to $\frac{5}{8}$ "	12.00
00	$\frac{5}{8}$ " to $\frac{7}{8}$ "	14.00
0	$\frac{7}{8}$ " to 1"	16.00
1	1" to $1\frac{1}{4}$ "	18.00
2	$1\frac{1}{4}$ " to $2\frac{1}{8}$ "	21.00
3	$2\frac{1}{8}$ " to $2\frac{1}{2}$ "	29.00
4	2" to $2\frac{1}{2}$ "	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin No. 1043.

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If you want steady, uninterrupted production — lower machine-repair costs and freedom from misalignment troubles, take advantage of the long-lived CUSHION TORQUE developed by the KANTI-LEVER COUPLING. It not only protects you against misalignment like the ordinary coupling, but it goes several steps further and cushions your Motors and Productive Machines against the wear, vibration and fatigue that are the source of most machine failures. No other coupling is like the—

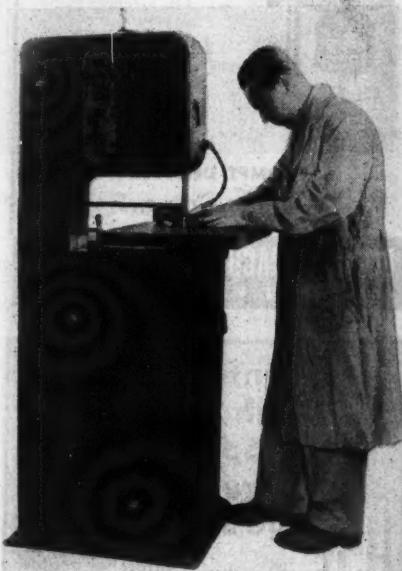
Kanti-lever Coupling

It has a circular series of laminated, resilient Cantilevers of 200,000 lb. steel operating in taper-side slots. End thrust is impossible: leverage on the cantilevers decreases automatically with increased load: safety stops prevent damage from extreme overloads: special end-float obtainable up to four inches without increase in cantilever stresses: outer periphery can be used as a brake drum for quick-stopping machinery. Over 3,000,000 H.P. in service. Send for Bulletin No. 28-M.

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DoAll Band Filing Machine

A continuous band filing machine of all-steel welded construction for file broaching operations on metals, plastics, fibers, and so on, is now being offered by Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis 4, Minn. Designated as the DoAll, the machine has a throat capacity of 15½ inches and thickness capacity of 6 inches. According to the manufacturer, workpieces can be quickly finished to within tolerances of 0.001 inch with the machine since work pressure and filing speeds are un-



DoAll Band Filing Machine

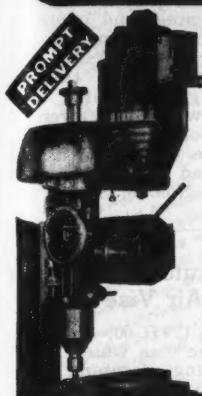
der complete control of the operator at all times.

The file band used in the DoAll Band Filer is available in 12 different types and sizes, including oval, half round, and flat types with widths ranging from $\frac{1}{4}$ to $\frac{3}{8}$ inch. The design of each file band allows for the easy performance of internal as well as external filing operations by merely unsnapping the band and inserting through the work.

The DoAll Band Filing Machine features Timken roller and Ollite bearings throughout and is equipped with a totally-enclosed worm gear drive transmission. Since most materials to be filed

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MILLING - DRILLING - BORING ATTACHMENT for Heavy Duty Operations



EASY MOUNTING

LARGE QUILL— 4" TRAVEL

(counter balanced,
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6 SPEEDS,
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Specially engineered by RUSNOK to meet the demand for heavier duty end mill operations. Uses many types of cutters on a wide range of work. Large size spindle (No. 9 B & S taper). Takes $\frac{1}{8}$ " to $\frac{3}{4}$ " end mills. Precision Engineered and Ruggedly Constructed Throughout.

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50 to 90%

No. 57T Automatic Metal Saws Grinder automatically sharpens metal saws in gangs up to 8" in diameter.

Takes gangs up to $3\frac{1}{2}$ " thick. Automatically indexes and sharpens within variation of plus or minus .001 of exact diameter of entire lot. Also handles other special work such as reamers, cams, etc.

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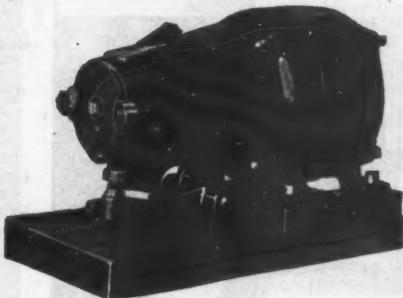
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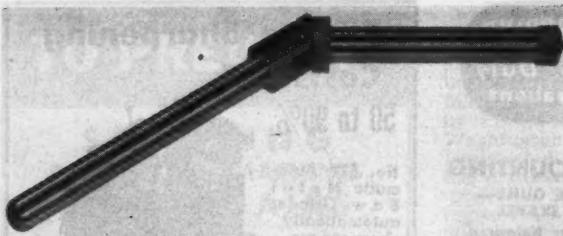
Drop us a line now and we'll send you complete details on
THE PERFECTION WIRE STRIPPER by return mail.



WEBER MACHINE CORPORATION

59 Rutter St.

Rochester 6, New York



F & H Key Setting Tool

require their own rate of cutting speed, the machine is provided with "Speed-master" variable speed pulleys which provide for any cutting speed from 50 to 250 feet per minute. The machine is also equipped with a blower for removing chips at the point of work and a portable lamp to illuminate the work at any desired angle. All controls of the machine are conveniently located for ease of operation.

F & H Key Setting Tool

Intended for airplane assembly, the F & H Key Setting Tool illustrated herewith has been developed by the F & H

Mfg. Co., 20338 Gratiot Ave., Detroit 13, Mich. The tool is made of machine steel and operates on the cam principle, the cutter moving into the workpiece and thereby cutting the desired keyway when the lever of the tool is actuated.

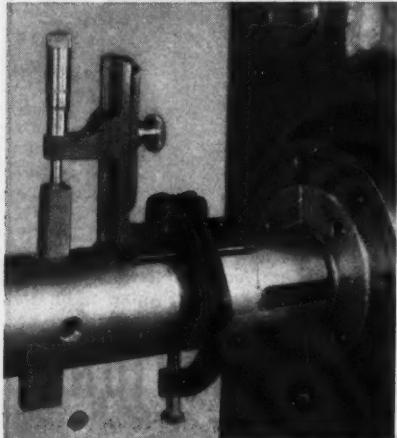
The cutter is made of hardened and ground tool steel and is available in three sizes; namely, Nos. 6, 8, and 10.

Bellows CVH-60 Automatic Milling Machine Air Vise

Designated as the CVH-60, an automatic milling machine vise which is adjustable for developing clamping pressures up to 40,000 lb. is announced by The Bellows Company, Akron, Ohio. Designed to fit all standard milling machines, the vise is of all-steel construction and is powered, through predeter-

BARTELT PEDESTAL MICROMETERS

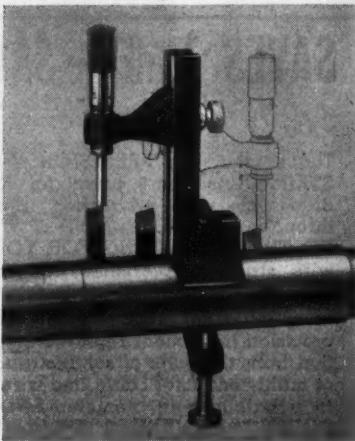
formerly called Bartelt Tool Setting Gage



**MODEL
"A"**



**MODEL
"B"**



★ These handy, practical gages will speed up boring work and help to produce accurate results more easily. Green hands are aided toward becoming good workmen more quickly. Available in two models, as shown. Three clamps furnished, to fit all boring bars from 1" to 5" dia.

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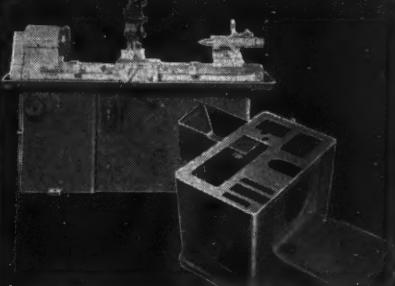
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Eliminate the waste
caused by ordinary
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Easy to hold. Cuts bond
from between the cut-
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wheel—leaves sharp,
clean cutting, longer
lasting surface... Write
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Any size or shape can be made in our
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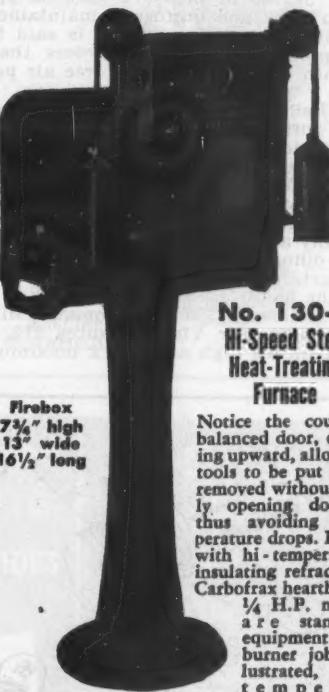


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DELIVERED IN ONE WEEK



Firebox
7 $\frac{1}{2}$ " high
13" wide
16 $\frac{1}{2}$ " long

No. 130-A Hi-Speed Steel Heat-Treating Furnace

Notice the counter-
balanced door, open-
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removed without fully
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Carbofrax hearth and
 $\frac{1}{4}$ H.P. motor
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equipment. 4-
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Bellows CVH-60 Automatic Milling Machine Air Vise

mined leverage, by a Bellows air motor operating on a line pressure of 90 to 100 lb. According to the manufacturer, any desired degree of pressure may be applied to work and uniformly maintained indefinitely. Air consumption is said to be extremely low, averaging less than one-tenth of a cubic foot of free air per cycle.

The Bellows CVH-60 Air Vise is provided with an integral double-acting valve which has an adjustable control lever, thus permitting operation of the valve from any angle in any plane. The control lever may be synchronized with any moving part of the machine to provide fully automatic operation. An automatic oiling device bathes all enclosed vise parts and linkage with an oil mist from the motor exhaust.

The Bellows CVH-60 Automatic Milling Machine Air Vise measures 27 $\frac{1}{2}$ x 6 x 4 $\frac{1}{2}$ inches high and has a maximum

jaw opening of 5 $\frac{1}{2}$ inches — the movable jaw being provided with a travel of $\frac{7}{8}$ inch and the fixed jaw having a maximum adjustment of 4 $\frac{1}{2}$ inches.

"Dustkop" Model 950 Medium Duty Self-Contained Dust Collector

A portable dust collector of the cyclone-filter type for exhausting dust and dirt-laden air from most types of medium-heavy abrasive operations has been added to the line of "Dustkop" dust collectors marketed by the Aget-Detroit Co., 604 First National Bldg., Ann Arbor, Mich. Designated as the Model 950, the unit is entirely self-contained, having a multiple blade fan direct-driven by a continuous duty motor, and a removable spun glass filter together with a cyclone type separator—



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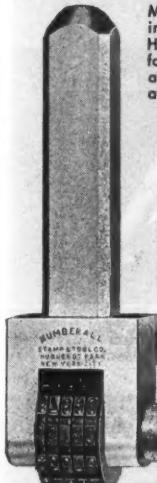
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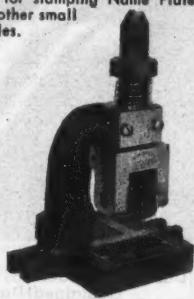
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No. 4 PLAIN TOOL AND CUTTER GRINDER

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Not excelled for grinding cutters on centers, 6 1/4" diameter — on holders, 14" diameter.

The Greenfield can also be supplied with attachments for cylindrical and internal grinding operations.

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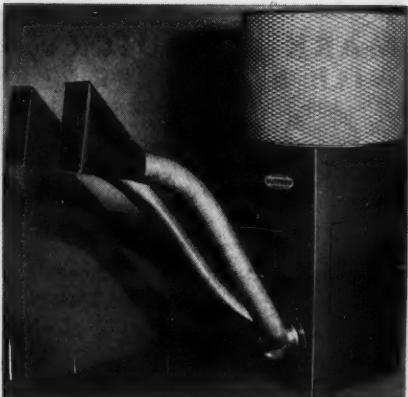
1418 Walnut St.,

Kansas City, Mo.



a combination which allows for the cleaned air to be recirculated into the working space so as to reduce heating losses to a minimum.

Recommended for collecting dust from production grinding operations on large wheel surface grinders, medium size double-end grinders, cut-off machines, emery and belt sanders, the Model 950 is powered by means of a 1/3 h.p. continuous duty motor and is rated at 490 cubic feet per minute with a single 5-inch inlet. An air velocity of 4,450 feet per minute with this inlet is considered ample for conveying dust from all types of



"Dustkop" Model 950 Medium Duty Self-Contained Dust Collector

T. H. LEWTHWAITE MACHINE CO.



FRONT LEVER BENCH PUNCH

Capacity $\frac{1}{16}$ " holes through $\frac{1}{4}$ " steel. Can also be made for holes up to $\frac{1}{8}$ " in thinner metal. Stock punches and dies available from $1/16$ " to $\frac{1}{4}$ " by 64ths. All parts interchangeable. Weight 70 lbs.

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abrasive operations.

Sufficiently light in weight so that it can be moved about as required, the Dustkop Model 950 Dust Collector requires less than 2 square feet of floor space and can be supplied with either one-way or two-way inlets. Connections between the source of dust and Dustkop are usually made by means of flexible metal hose without the use of tools.

In use, dust and dirt-laden air drawn in through the inlet connections near the floor level is sent through the cyclone separator by means of the multiple blade fan. The cleaned air emerges from the top of the cyclone and is returned to the working space after passing through the high efficiency spun glass filter which forms the upper portion of the collector. The dust that is separated out of the air by the cyclone separator drops into a readily accessible glass storage jar which is fastened to the lower end of

New Nesting Type Tote Pans



20" long x 12" wide x $6\frac{1}{2}$ " deep.
16 ga., drag holes and handles both ends.

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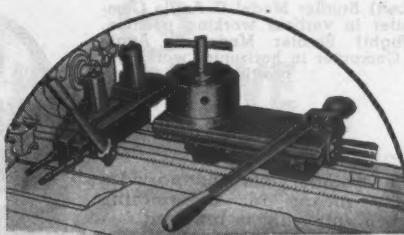
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Conversion bed turret with 10 inch travel, equivalent to No. 3 turret; self-indexing, with pilot wheel.

LYNN TOOL POST TURRETS

Self-indexing. For lathes with 12" to 28" swing. Holds 4 tools; indexes to 8 positions. Hardened indexing pin and inserts. No cams to wear. Solid steel blocks — sizes 5½", 6½", and 8".



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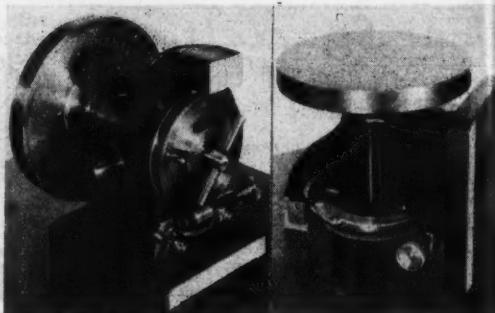
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Airplane spruce is used throughout. Steel braces. Safety shoes. Sizes 3' to 16' in height—Elevating platform adds extra height to Dayton Ladders. Write today for prices, catalog.

DAYTON SAFETY LADDER

121 - 23 THIRD ST. CINCINNATI, OHIO

(Left) Studler Model C Angle Computer in vertical working position.
(Right) Studler Model C Angle Computer in horizontal working position



the cyclone cone and provides easy means for determining when emptying is required.

The fan, motor, and cyclone separator are enclosed in the steel cabinet which forms the base of the unit. The drum top, which consists entirely of the filter, can be removed for inspection or cleaning by loosening four wing nuts and lifting off the entire drum.

For most rapid installation, the Dust-kop Model 950 Dust Collector can be supplied with wheel hoods and flexible metal hose as shown.

Studler Model C Angle Computer

Specially designed for general shop use, the Studler Model C Angle Computer illustrated herewith, product of the

Angle Computer Co., 5720 Melrose Ave., Los Angeles 38, Cal., is equipped with protractor and vernier which are calibrated in one-minute or 21,600 precise spacings. As shown, the unit is designed to afford two working positions.

The faceplate of the unit is 10 inches in diameter x 1 inch thick. An interchangeable surface plate is 5 x 10 x $\frac{1}{8}$ inch. A fine grade heat-treated cast-iron alloy is used for the body of the Model C and machine steel for the spindle. Brake shoes are cast iron and are fixed in place and machined at the same time



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You will eliminate many costly hours from your Payroll by using the JACKSON TIME-SAVING VISE. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the—

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Coiled Rawhide faces strike effective blows without marring or battering; speed up work; reduce spoilage. Hold true faces—strike accurately. Outlast several ordinary mallets. Reduce bounce and recoil—prevent fatigue. All sizes with light or weighted heads. Write for Catalog.

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on straight, spiral or taper work—because
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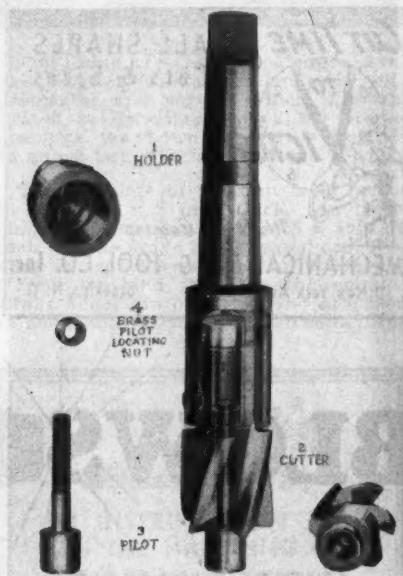


306 MODERN MACHINE SHOP

that the main bearing is bored to assure perfect alignment so that when the brake is applied, the work is not distorted or moved.

Moreland Shearproof Counter-bore Drive

Utilizing the eccentric principle in its design to completely equalize the torque load on the holder and the mating driv-



Moreland Shearproof Counterbore Drive

ing member of the cutter, the Moreland Shearproof Counterbore Drive illustrated herewith is now being produced by the Moreland Tool Co., 16935 W. McNichols Rd., Detroit, Mich. As shown, the driving member of the cutter fits into a spherical off-center hole in the holder, both the shank of the cutter and the corresponding hole in the holder being round in shape and eccentric in location only. This method of coupling cutter and holder is said to eliminate any tendency toward shearing action.

According to the manufacturer, concentricity of the assembled unit is held to the closest of precision tolerances by means of a "stick taper." The angular

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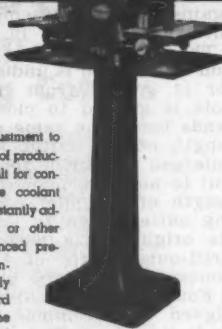
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Both Spindles
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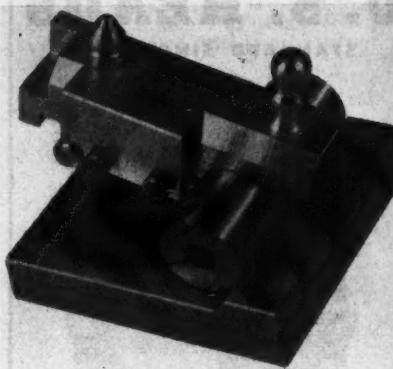
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notch used in holding the driving member of the cutter in the holder is so positioned as to assure a full contact of the driving members when assembled. It also provides a mechanical check against careless assembly of holder and cutter that results in premature wear.

The pilot functions only as a guide and its location is undisturbed when cutter is drifted from holder. The pilot hole is ground to close limits and extends back, the same diameter, the full length of the cutter flutes where it is enlarged to provide for inserting a brass nut to hold the pilot in place. The long length of the pilot allows for sharpening cutter down to less than one-third its original size without affecting the drift-out feature of the cutter or the concentricity of the pilot.

Four sizes of holders, which are designed to accommodate cutters up to and including 3 inches in diameter, straight or tapered shank, are available.



Florian Sine Angle Wheel Dresser

Angle Wheel Dresser shown herewith has been placed on the market by The Florian Mfg. Co., Plantsville, Conn. By means of the unit together with the aid of standard gage blocks or adjustable parallels, wheels may be quickly dressed to any angle from 0 to 90 deg. within an accuracy of plus or minus 10 seconds. The setting is determined by the simple

Florian Sine Angle Wheel Dresser

Especially designed to facilitate the task of dressing wheels of surface grinders to required angles, the Florian Sine

**YOU CAN HOLD THOSE CLOSE TOLERANCES ONLY WITH SHARP,
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ONE Black Diamond Drill Grinder, in any average Plant, will meet all production demands for accurately ground Small Gauge and Fractional Drills.

On this machine, any apprentice becomes a skilled operator . . . produces quantities of sharp drills, ground to perfection . . . with lips of uniform length . . . correct angle . . . proper clearance for accurate drilling.

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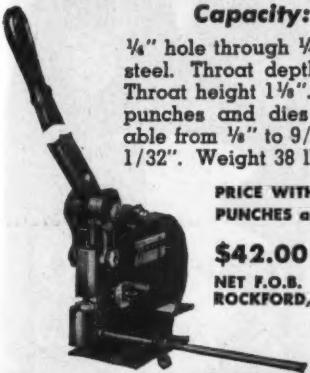
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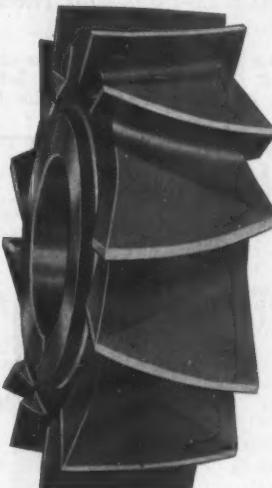
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formula, $\sin x \times 2$ inches plus 0.300 inch = angle.

The Florian Sine Angle Wheel Dresser is ruggedly built to withstand everyday shop use and is provided with hardened, ground, and lapped bearing surfaces.

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Vard John-Sons Roll Thread Snap Gage

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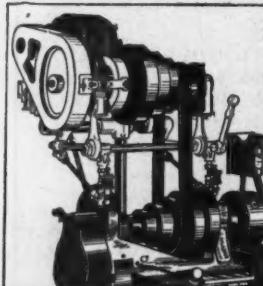
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Vard John-Sons Roll Thread Snap Gage.

and wide machine pads for bench stand setups. The frame is made of a special grade high strength cast iron with low reaction to temperature changes, and is protected by durable wrinkle finish.

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Avoid costly shutdowns.

A "short" in a motor can't "gum-up" production from a machine tool equipped with a Remco Drive. Simply unbolt and remove the "dead" unit and substitute another motor—a matter of minutes. Only the Remco Motor Drive has a patented universal motor mounting which takes any motor of reasonable size—new or USED. Nothing else like it! Write—Remco Products Corp., State and Hay Sts., York, Pa.

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for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

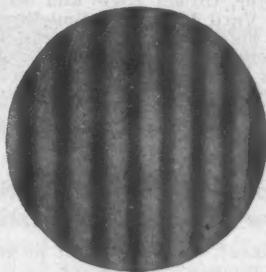
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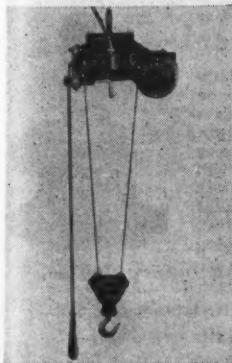
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The CABLEMASTER may be installed at each machine or bench to handle heavy lifting and facilitate inspection. Eliminates waiting for general overhead hoist. Enables women to take on scores of new jobs.

CABLEMASTER is available in 250, 500 and 1,000 lb. capacities. Each size especially designed for its rating. Equipped with hook or trolley mounting. Quickly attached to present monorail. Four-foot jib crane also available. Phone, write or wire for complete details on CABLEMASTER hoists.



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gage allowing for checking of such critical conditions in the thread as pitch diameter, thread angle and lead.

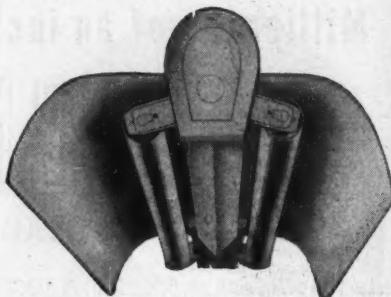
The Vard John-Sons Roll Thread Snap Gage is offered in sizes ranging from numbered series up to and including 12 inches and may be obtained in National, Metric, Acme, Whitworth, and other special thread forms.

Fostoria Model MF-240-N "Generalite" Fluorescent Lighting Unit

To meet the demand for an instantaneous starting fluorescent lighting unit, The Fostoria Pressed Steel Corp., Fostoria, Ohio, has added the Model MF-240-N shown herewith to its line of "Generalite" equipment for illuminating work area surroundings.

Outstanding features claimed for the unit include the elimination of starting switches; average lumen output; low voltage operation, and satisfactory lamp life. The lumen output of the unit is approximately the same as Fostoria's MF-240 or any other two-lamp 40-watt unit powered by conventional ballast; namely, 4200 lumens when using 3500-deg. white lamps.

Low voltage operation is said to be important where there is a fluctuation in line voltage. The Model MF-240-N,

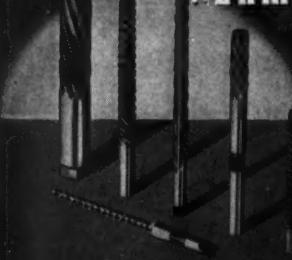


Fostoria Model MF-240-N "Generalite"
Fluorescent Lighting Unit

according to the manufacturer, will continue to operate even though the voltage drops momentarily below 50.

The Fostoria Model MF-240-N Generalite Fluorescent Lighting Unit operates on a power factor of 98 per cent at 118

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Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 2 3/4", 3 3/4", 5 1/4" and 7 1/2" closed heights.



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How TO OVERCOME SPINDLE MISALIGNMENT!

and Simplify Tapping and Reaming

The easiest way of overcoming misalignment between the spindle and the work, in tapping and reaming, is to use a tool holder so designed that it compensates for such inaccuracies, even though they amount to as much as 1/32 of an inch.

This is what the Ziegler Tool Holder does: And because it does it automatically, it greatly simplifies tapping and reaming, reducing spoilage losses from oversize and bell-mouthed holes, and also reducing set-up time.

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FEATURES

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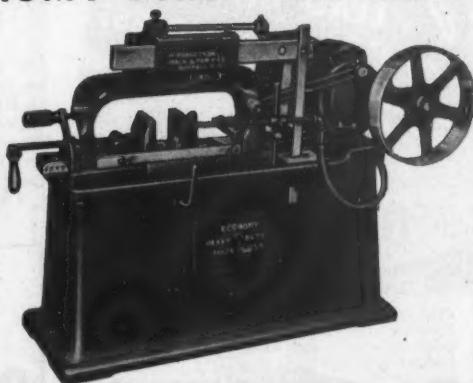
Few Adjustments

Hydraulic Lift on Back Stroke

The machine illustrated is the ROBERTSON ECONOMY No. 3-B. Capacity: 6" x 6" with 6" stroke. Takes 10", 12", 14" blades.

There is a ROBERTSON ECONOMY for every cutting job.

Write for information
and delivery dates.



W. ROBERTSON
MACHINE & FOUNDRY CO., INC.

52 RANO ST.

BUFFALO 7, N. Y.

volts and is connected for stroboscopic effects. It is designed to accommodate two 40-watt fluorescent lamps mounted on 5-inch centers and is built to conform to Bureau of Standards recommendations.

Like all other Generalite units, the Model MF-240-N is constructed with a V-wiring channel which separate the two lamps and thereby eliminates light absorption from one lamp to another. Ease of maintenance is afforded by a design which permits the non-metallic reflector of the unit to be removed from the top without interrupting lamp operation.



Cut Set-Up Time

75% through use of the
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Clamp directly over work. For use on all machines with T-slots. Standard and Heavy-Duty type.

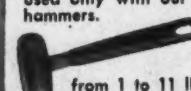
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Lead hammers with SHUR-GRIP or plain handles in sizes from 1 to 11 lbs. in stock. Send for illustrated bulletin. Address Dept. M-1.

JOHNSON TOOL COMPANY
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ation. When the reflector is removed, all wiring in the V-channel is exposed.

Finish on the unit both inside and out is gloss white synthetic enamel which is baked hard and marproof by near infra-red and may be easily cleaned with soap and water.

Anker-Holth Foot-Operated Air Valve

A foot-operated valve for use with various types of pneumatic equipment, such as air holding devices on lathes,



Anker-Holth Foot-Operated Air Valve

air vises, pneumatic cylinders, and so on, is now being offered by the Anker-Holth Mfg. Co., 332 S. Michigan Ave., Chicago 4, Ill. The valve is of the disc type, which is said to assure long, trouble-free life, and is made in sizes from $\frac{1}{4}$ to $\frac{1}{2}$ inch.

The design of the Anker-Holth Foot-

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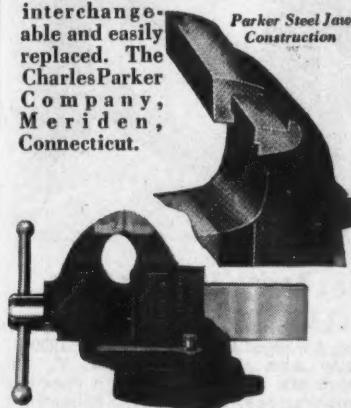
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The tool steel jaws of the Parker Vise hold delicate work firmly, yet carefully. For the extra-hard, even surface of these jaws eliminates marring that comes from chipped, uneven jaw faces. For added protection, the entire top of the Parker Vise is covered with tool steel. Jaws are interchangeable and easily replaced. The Charles Parker Company, Meriden, Connecticut.

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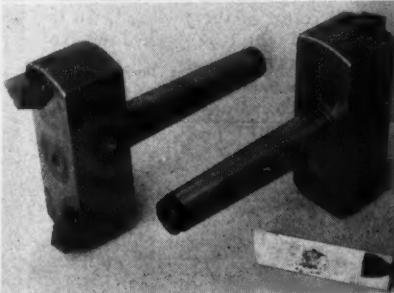
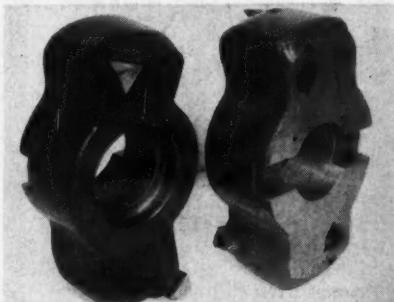
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Operated Air Valve is such that when the pedal is depressed and the foot removed, the pedal is returned to neutral position by means of a spring, however, pressure on the work being held is maintained until the pedal is again depressed.

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Fly cutters with one or more triangular-shaped tool bits set at suitable rake and shear angles have been added to the



Weddell "Tri-Bit" Fly Cutters

line of "Tri-Bit" cutting tools manufactured by Weddell Tools, Inc., 1239 University Ave., Rochester 7, N. Y. These cutters are designed for high speed milling operations, particularly those involving the milling of aluminum or magnesium or the carbide milling of steel.

The cutter bits or blades may be ground for roughing or finishing operations, or one blade may be ground to cut on the diameter for roughing and the other set ahead on the face and ground under diameter with a lead for finishing. The triangular-shaped blades

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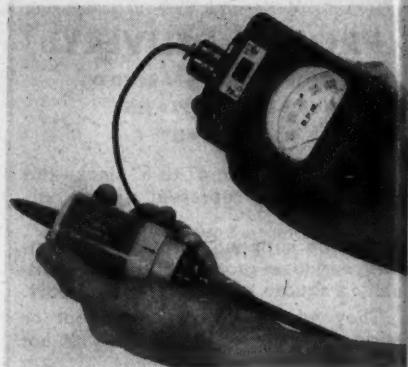
are rigidly clamped in V-shaped holes by means of lock screws, and are provided with simple means for adjusting for size or wear. The blades can be furnished in high speed steel, cast alloys, or carbide tipped.

Made with either heat-treated alloy or cast Meehanite bodies, Weddell Tri-Bit Fly Cutters are available in diameters of $2\frac{1}{2}$ inches and up and can be furnished with solid shanks or in shell types to fit standard or special arbors.

Ideal Electric Tachometer

A self-energized tachometer which is available in two sizes for 0 to 2,500 r.p.m. and 0 to 5,000 r.p.m. has been placed on the market by Ideal Commutator Dresser Co., 4004 Park Ave., Sycamore, Ill. The tachometer consists essentially of a small generator, coupled electrically to an electric meter. The generator itself consists of a small, permanent "Alnico" magnet rotor which is mounted on precision sealed ball bearings and is designed for continuous operation at any speed within limit of the meter.

The meter or indicating instrument is



Ideal Electric Tachometer as "Separable Type"

a rectifier type, including a sturdy D'Arsonval movement, and is said to be capable of withstanding a momentary overload up to four times the maximum speed indication without damage. The meter is provided with two scales—"Hi" and "Lo." The "Hi" scale indicates the maximum reading obtainable. A small switch incorporated in the meter case

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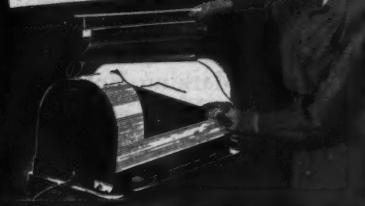


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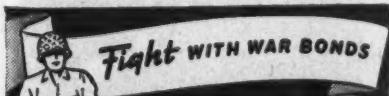
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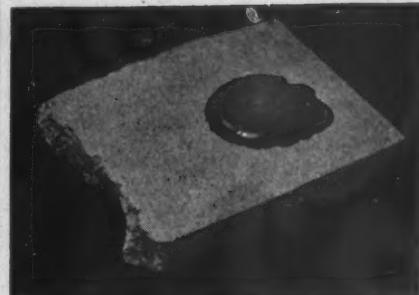
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January, 1944



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A floor lasts just as long as disintegrators, such as oil, acid, water and grease can be prevented from penetrating the surface and attacking the bonding element. Imperviousness has been developed to the utmost in AWOG floors. The micrographs at right show this. Upper graph shows the greatly magnified surface of an ordinary concrete floor; lower graph the surface of an AWOG floor. It will be noted that the pores or voids in the upper graph are wide open, while the lower graph of the AWOG floor shows practically no voids at all. AWOG is recommended for new floors; for over-lays over brick, stone, or wood; for repairing or resurfacing areas of any size indoors or out.



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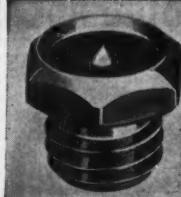
provides for easy changing from "Hi" to "Lo" range.

The generator and meter are made as distinctly separate elements and are coupled together by a precision-made bayonet lock. The units may be used together as a "Hand Type" tachometer, or for many applications including permanent mounting, the generator and meter may be separated ("Separable Type") and connected only by a two conductor electric cord. A 5-foot cord complete with coupling plug is provided, however, a cord up to several hundred feet long (of proper size wire) can be

used without introducing an appreciable error in scale reading.

The generator only is 1½ inches in diameter x 3¾ inches long (including ¾-inch shaft extension) and weighs 8 ounces. The meter is 3 x 4¾ x 2½ inches and weighs 20 ounces. The complete unit is 3 x 7½ x 2½ inches (including ¾-inch shaft extension) and weighs 3 pounds.

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Cunningham Safety Hand Model Gear Marking Holder

The accompanying illustration shows a safety hand model gear marking holder now being marketed by the M. E.



Cunningham Safety Hand Model Gear
Marking Holder

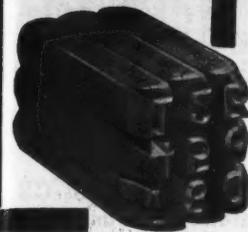
Cunningham Co., 158 E. Carson St., Pittsburgh 19, Pa. The holder is designed for use with straight instead of tapered type, the type plate being cut out for the exact number of characters desired. A special method of holding the type in place prevents characters



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You **COLLECT** when you use **THOR STAMPS**—because their correctly-heated alloy steel assures more marks per dollar. Central striking point gives uniform indentation. Thumb side-marking makes them easily read—easily used.

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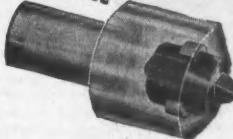
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Because: Wing key
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Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

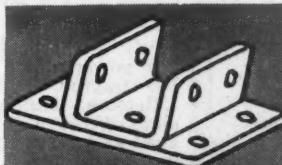
All diamond sizes $\frac{1}{4}$ to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.)

**Write for Catalog showing Most Complete Line
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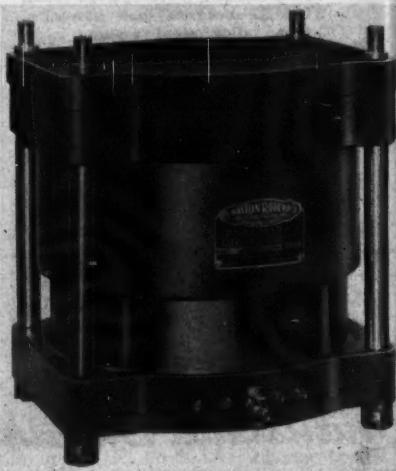
96 Warren St., New York, N. Y.

from flying or falling out of the holder.

The pilot, which is designed to suit the hub of the gear to be marked, allows for accurate positioning of letters and is made of a special "Safety" steel that is said to be resistant to spalling or mushrooming.

Dayton Rogers Model CB Pneumatic Die Cushion

Designated as the Model CB, a self-contained pneumatic die cushion that may be quickly and easily mounted di-



Dayton Rogers Model CB Pneumatic Die Cushion

rectly to the bolster plate of practically any power punch press is announced by the Dayton Rogers Mfg. Co., 2835 S. 12th Ave., Minneapolis, Minn. The design of the unit includes an all hardened and ground pin pressure pad which can be machined and fitted to the press bed opening of the individual press used, thus increasing the pin pressure area to the maximum capacity of the press bed opening.

According to the manufacturer, the Model CB die cushion cannot only be used to control draw rings during deep drawing operations but may also be used to control the pressure pads on a large percentage of forming dies. The unit is

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"We are in serious trouble," the Superintendent of a large Mid-Western plant 'phoned to our local service man.

The job—Turret Rings for U. S. Army Tanks. Thirty-two precision tapped holes in each ring of the toughest hard steel that can be used. With Reiff & Nestor High Speed Ground Thread Taps of correct design, "Turret Ring production now up 30% at less than 50% of former Tap cost," says the Superintendent of this Mid-Western plant.

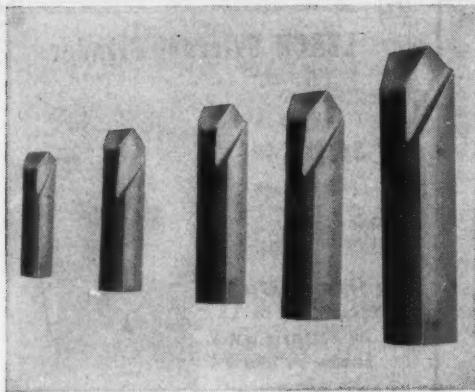
Reiff & Nestor High Speed Ground Thread Taps

Meet the need for Production Speed.

REIFF and NESTOR CO.

LYKENS, PENNA.





Kennametal Solid Round Boring Tools

Kennametal Solid Round Boring Tools

A line of solid round Kennametal tools ground for immediate use in precision boring machines is announced by Kennametal, Inc., 300 Lloyd Ave., Latrobe, Pa. The tools are available in two styles designated at 27SR and 29SR. Style 27SR tools have side cutting edge angles of 30 deg. and end cutting edge angles of 28 deg., and are designed primarily for use in 30-deg. boring bars. Style 29SR tools have side cutting edge angles of 45 deg. and end cutting edge angles of 38 deg., and are designed primarily for use in 45-deg. boring bars.

Both style tools are available in five sizes—3/32, 1/8, 5/32, 3/16, and 1/4 inch—and in grades K3H and K4H. According to the manufacturer, tolerances are held to +0.000 and -0.001 inch on diameters and to +0.000 and -0.005 inch on all other dimensions.

made in sizes from 6 to 24 inches, having drawing capacities from 2 to 12 inches, and is designed to develop ring holding pressures from 1½ to 23 tons on 100-lb. air line pressure. The cushion is supplied complete with combination reducing regulator and valve and pressure gage, together with high pressure hose fittings, ready to be mounted on the press.

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ON *Bond*
SPEED REDUCERS
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ASK OUR ENGINEERS —
THEY ARE AT YOUR SERVICE
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GA-104

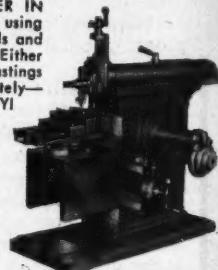
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PROMPT DELIVERY! LOW PRIORITY! On This LEWIS 10" Metal Shaper

COMPLETE THIS SHAPER IN YOUR OWN SHOP, using Lewis Castings, Materials and Construction Blueprints. Either rough or semi-finished castings can be shipped immediately—AND ON LOW PRIORITY! Check the features of this low-cost production tool, useful for all small shaping jobs: Head swivels 60° each side of vertical... Table swivels 90° each side of zero and is keyed for normal setting... Ram is rigidly supported and fully adjustable for stroke...gibs



provided on all sliding surfaces...Five automatic cross-feeds adjustable in steps of .002" ... large bull gear and pinion give efficient power transfer. Height 24", base 12" x 27".

Lewis MACHINE TOOL CO.

Dept. T36

P. O. Box 116, Sta. A, Los Angeles 31, Calif.

"Diehl-Lite" Supplemental Lighting Fixture

A supplemental lighting fixture which is said to be ideally suited for industrial inspection, assembly and sorting operations and precision machine work, to be known as the "Diehl-Lite," is now being marketed by the Diehl Mfg. Co., Flanders Plant, Somerville, N. J. The fixture is equipped with a blue-tinted lens that is said to provide non-glare daylight beam illumination, with maximum intensity over the area where light is most needed. Additional crystal clear or



"Diehl-Lite" Supplemental Lighting Fixture

ruby red lenses are available for special uses of the fixture in ship chart rooms, signal and warning devices, and so on.

The light unit, housed in a sturdy molded bakelite casing, is mounted on an adjustable tubular steel arm with three ball-and-socket joints, providing simple and accurate adjustments of light for best visibility to operator. Long life and resistance to shock are said to be assured through the use of a special 6-8 volt lamp with patented brass contacts. Control is provided by a toggle switch.

Standard equipment of the Diehl-Lite Supplemental Lighting Fixture includes 110-volt or 220-volt transformer, approved oil-resistant wiring, and attachment plug.

January, 1944

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ACCEPTANCE**

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We can make your tools do more work, and last longer, too. We have U. S. Army and U. S. Navy Aircraft Approval for heat treating, obtained after rigid tests and careful check-up by Army and Navy personnel. Perfection's skilful work is helping manufacturers in 31 states... 26 years specializing in treating tools, dies, molds, and "fussy" mechanical parts. We treat tons of tools—in wide variety. Many require the use of 5 or 6 furnaces to get just the right result. When ordinary methods do not suffice, we have new ones like these:

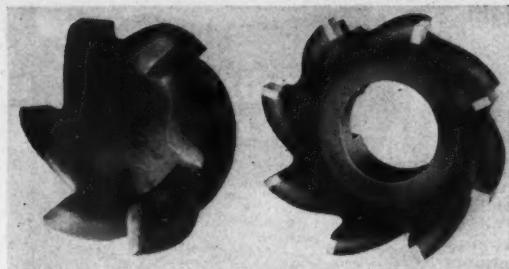
DEEPFREEZING—The ideal way to quick-age parts, stabilize gauges, and get rid of retained austenite.

NUSITE—Produces higher hardness (65 to 67 Rockwell C) throughout high speed cutting tools—and still they are almost twice as tough.

SILVER FINISH—Bright hardening... up to 1900 deg. F. No scale or discoloration. Polished pieces retain their shine. Saves grinding. Fine for engraved dies, threaded parts, die casting, and inserts.

Tell us your problems. We have the equipment, skill, and experience to solve them quickly and economically.





(Right) Farrel-Birmingham Meehanite Milling Cutter Body. (Left) Finished Cutter with Brazed-on Carbide Tips

Farrel-Birmingham Meehanite Milling Cutter Bodies

To facilitate the application of the correct milling cutter to a particular piece of work, the Farrel-Birmingham Co., Inc., Ansonia, Conn., has developed milling cutter bodies of Meehanite which can be machined for carbide or cast alloy tips within a broad range of rake and spiral angles. To make the desired cutter from one of these bodies, the user faces, bores, and slots the hub to suit his requirements, mills the tooth seats, and brazes on the desired tips.

According to the manufacturer, the

Meehanite used in making the cutter bodies allows for operation of finished cutters at unusually high speeds, provides for reduction in chatter and for long tip life. In addition, since Meehanite has a coefficient of expansion which is very close to that of carbide, an excellent bond between cutter bodies and tips can be obtained.

Plan-O-Mill Large Multiple Thread Milling Cutter

One of the largest multiple thread milling cutters ever produced is now being offered by the Plan-O-Mill Corp., 1511 E. Eight Mile Rd., Hazel Park, Mich., for use in threading gun tubes, breech blocks, and other internally and externally threaded parts up to 16 inches

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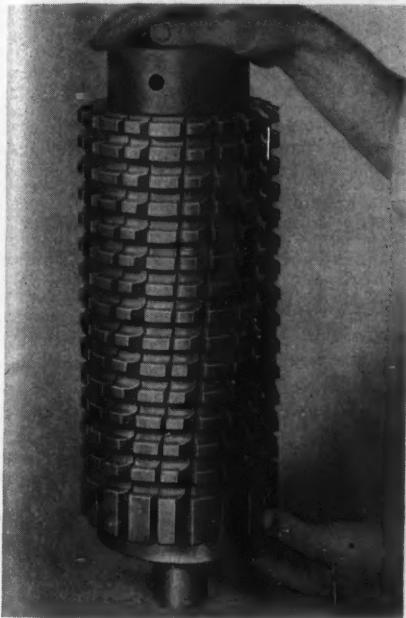
125 Barclay St. The HAMILTON TOOL Co.
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in diameter. The cutter is 12 $\frac{1}{2}$ inches long x 6 $\frac{1}{2}$ inches in diameter, and provides the Higbee cut by which the imperfect thread is removed coincidental with milling the thread.

To allow for uniform hardening during manufacture, the cutter is made up of segments. This segmental design is also said to provide the cutter with a spiral gash cutting action for smoother milling and improved work finish, with straight gash grinding.

In threading gun tubes, the cutter can



Plan-O-Mill Large Multiple Thread Milling Cutter

be used for rough, semi-finish, and finish cuts. Resharpening of cutter is said to be easily accomplished.

Tamaloy Diamond Hone

A diamond hone for high speed steel, carbide, and other cutting tools has been added to the line of Tamaloy products produced by the Tungsten Alloy Mfg. Co., 65 Colden St., Newark 4, N. J. The diamonds of the hone are set in a matrix of tungsten carbide which is said to re-

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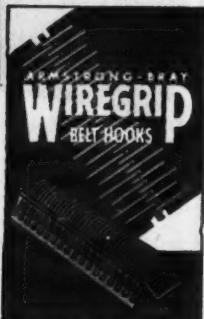
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sist wear and prevent diamonds from being displaced when rubbed against hard surface or edge.

The Tamaloy Diamond Hone is provided with a convenient nonslip handle and is supplied in three grades; namely, rough (100 grit), medium (150 grit), and fine (200 grit).

Industrial "Super-Cut" Diamond Bonded Wheels

A line of diamond bonded wheels to be known as "Super-Cut" is now being marketed by Industrial Abrasives, Inc., 3724 W. 38th St., Chicago 32, Ill. According to the manufacturer, a unique molten bonding process assures uniform distribution and density of diamond concentration in the cutting surface of each wheel, thus providing for fast, smooth cutting action together with unusually long wheel life.

Industrial Super-Cut Diamond Bonded Wheels are made in a variety of types and sizes, thereby enabling them to be adapted to a wide range of grinding operations.

Black Magic Coloring Processes for Gages

According to an announcement made by the Mitchell-Bradford Chemical Co., 2446 Main St., Stratford P. O., Bridgeport, Conn., the Black Magic processes developed by this firm for coloring metals are now being widely used in treating plug, ring, and other types of gages as a means for indicating surface wear.

Black Magic is said to penetrate the surface of a gage not more than 0.0001 inch, providing a deep black finish which is easily distinguished from the color of steel so that when the gage is worn beyond this amount (0.0001 inch) the bare metal is shown in sharp contrast. The finish imparted to the gage becomes a part of the steel itself and does not change the precision dimensions, surface hardness, or wearing qualities of the gage, it is claimed. Scratches and nicks are also said to show up vividly when gages are thus finished.

The color is applied to gages by boiling in a special salt solution, followed by rinsing in cold water. The finish provided is said to protect the gages from corrosion and stain from the workers' hands.

EDUCATIONAL FILMS

Magnesium Film

The Dow Chemical Company has prepared a technical film concerning processing methods for magnesium alloys. The film deals with the machining, welding, forming, riveting, and surface treating of magnesium and is available for showing before engineering, industrial, and technical society groups.

Requests for the film or for information regarding it should be directed to The Dow Chemical Co., Midland, Mich.

"Welding Stainless Steel"

As an aid in teaching welding students, as well as welders familiar with carbon steel welding, the fundamentals of working with stainless steels, the Allegheny Ludlum Steel Corp., Brackenridge, Pa., has prepared a 16 mm. full color sound motion picture entitled "Welding Stainless Steel." While primarily produced to explain stainless steel welding in simple terms that a shopman can understand, this film should also be of great interest to the

most experienced metallurgist or engineer. Particularly unique are the extreme close-ups of the arc at work, greatly magnified so that the action of the protective flux and the very melting of the rod metal can be clearly seen.

The action of "Welding Stainless Steel" begins with a comparison of the basic differences between the metallurgical characteristics of that alloy and ordinary steel. From there the audience is shown step by step the preparatory work necessary to complete good, sound weld joints, with warnings being given as to danger points. Methods for laying beads with one pass of the arc, two-sided welding, as well as multiple bead welding on heavy gauges, are thoroughly explained and further clarified with appropriate charts.

This two-reel film, which has a showing time of approximately 25 minutes, will be sent without charge, express prepaid, upon valid request by companies, trade or technical groups, industrial schools or colleges, and so on. Several alternate dates for the showing of the film should be given so that arrangements can be completed whereby a print will be available for one of those dates.

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NEW BOOKS

Radiographic Inspection of Metals. By Otto Zmeskal. Published by Harper & Brothers, 49 E. 33rd St., New York, N. Y. 150 pages. 89 illustrations. Cloth binding, board covers. Price, \$2.75.

"Radiographic Inspection of Metals" was written to meet the demand for an introductory textbook presenting the principles and practice of radiography created by the ever-increasing applications of this technique in the inspection of metals. No attempt is made to discuss physical theory or X-ray apparatus. The book is based upon lectures given by the author to his classes in the radiographic inspection of metals at the Illinois Institute of Technology.

Contents of the book are as follows: Chapter I, Introduction; Chapter II, The Source of Radiation; Chapter III, Equipment for Industrial Radiography; Chapter IV, Fundamentals of Radiographic Practice, Part I; Chapter V, Fundamentals of Radiographic Practice, Part II; Chapter VI, Applications; Chapter VII, Glossary of Terms; Selected References; Appendix I, Critical Absorption Wave-Lengths (K Series), Voltages Required to Excite Characteristic Radiations and Most Intense Wave-Length in Beam So Produced; Appendix II, Penetrometers; Appendix III, Stereoscopic Tube Shifts; Appendix IV, Minimum Focus, Film Distance for Gamma Ray Radiography; Index.

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Machinery's Handbook Twelfth edition. By Erik Oberg and Franklin D. Jones. Published by The Industrial Press, 148 Lafayette St., New York, N. Y. 1,815 pages, 4 1/2 x 7 inches. 1,310 illustrations. Cloth binding, flexible covers. Price, \$6.00.

In an endeavor to keep pace with important current developments in the machine-building field, "Machinery's Handbook" has again been revised. This twelfth edition features 136 main sections containing information on thousands of items which may be readily located by a very complete index at the rear of the book. A special thumb index provides for opening the book instantly to any of the 14 principal divisions most frequently consulted.

Important revisions or additions found in the twelfth edition include: planetary gear designing charts containing clearly arranged diagrams showing 24 different planetary gear designs or problems with simplified formulas for finding the ratio

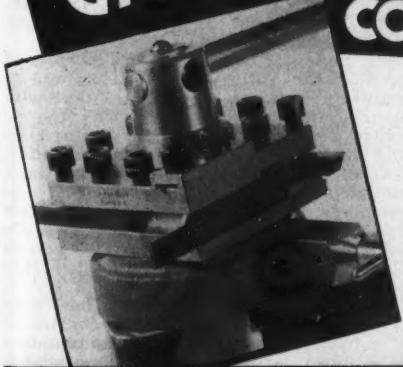
and direction of driven gear rotation; miscellaneous additional formulas relating to strength of materials and other designing problems; Class 5 screw thread fit for threaded steel studs as approved for federal service by the government, with table of stud and tapped hole sizes in both coarse and fine-thread series; standard grinding wheel markings adopted by the Grinding Wheel Manufacturers' Association to indicate abrasive grain size, hardness or grade, structure or density, and bonding process; permissible variations in sizes of cold-finished and hot-rolled bars; American standard thread gage and plain gage tolerances; manufacturers' standard gauge for sheet steel (now used in place of the original U. S. standard gauge); thickness tolerances adopted by sheet steel manufacturers for both hot-rolled and cold-rolled sheets; American standard pipe threads (1942 revision), including taper threads, straight threads for mechanical joints, and internal threads for couplings and lubrication fittings; American standard for gas cylinder outlet threads; American standard hose connections for welding or cutting torches; aeronautical screw thread series; tipping tools with high speed steel and carbide tip; braze-hardening; revisions in S.A.E. steels, including both old and revised

composition numbers; general applications of S.A.E. steels with 270 typical uses arranged in tabulated form and alphabetical order; standard speeds for motor reducers as adopted by National Electrical Manufacturers Association, and various other revisions and improvements.

Timestudy for Cost Control. Second edition. By Phil Carroll, Jr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. 287 pages, 6 x 9 inches. 53 illustrations. Cloth binding, board covers. Price, \$3.00.

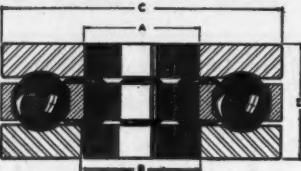
This book represents a complete manual for industrial engineers and shop executives who wish to understand fully the fundamentals and methods of time-study in order to plan and supervise the installation or improvement of a time-study system in their business and to make the fullest use of the controls it offers. The application and advantages of timetudy and control based on predetermined standards are explained, the personnel and equipment of a standard departure are described, and all details for carrying out the work are presented

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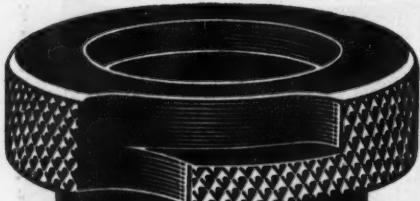


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In this second edition, new material has been added from experiences gained since the book was originally prepared. Several papers subsequently written have supplied other improvement. Participation of the author in many technical discussions, particularly with the Society for the Advancement of Management-committee on "Rating of Time Studies," has prompted the expansion of the two important parts of the mechanics of timestudy into the separate chapters Element Timestudy and Rating the Timestudy.

The 22 chapter headings of the book are as follows: Timestudy for Control; Standard Data; Management Initiates Control; The Standards Department; Type of Man; Beginning the Timestudy; Element Timestudy; Rating the Timestudy; Element Standards; Planning the Solution; Comparison Sheet; Setup Standards; Treatment of Variables; Working Data; Typical Working Data; Standardizing Specifications; The Standard Data Write-Up; Setting and Recording the Standard; Application of Measurement; Direct Rules of Measurement; Maintaining the Measure; Basis for Control. The book also includes at the rear a manual of fundamental engineering data for use by operating timestudy men, and a complete index.

Design of Machine Members. Second edition. By Alex. Vallance and Venton Levy Doughtie. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 13, N. Y. 559 pages. Cloth binding, board covers. Price, \$4.00.

In revising the text for the second edition, the authors have attempted to maintain most of the original text with such additions and revisions as are required by new developments in materials and design procedure. Additional information on nonferrous materials has been included because of their growing importance in present-day designs. Some information dealing with the recently developed nonmetallic materials such as plastics, synthetics, and so-called rubber substitutes has been added.

The order of the chapters has been changed to provide a better continuity of subject matter. Some of the chapters have been largely rewritten in an attempt to clarify some portions and to incorporate recent developments.

This volume includes a total of 23 chapters which are headed as follows: Introduction; Engineering Materials;

Stresses in Elementary Machine Members; Design Stresses and Factor of Safety; Riveted Joints; Welded Joints; Bolts and Screws; Keys, Cotters, and Knuckle Joints; Shafts; Couplings and Clutches; Brakes; Springs; Sliding Bearings; Roller and Ball Bearings; Belts and Belt Conveyors; Rope Drives; Hoisting and Power Chains; Spur Gears; Bevel, Worm, and Spiral Gears; Cylinders, Pipes, and Tubes; Flat Plates and Cylinder Heads; Metal Fits and Tolerances; Miscellaneous Machine Members. A section containing problems for assigned work, as well as an index, is provided at the rear of the book.

most engineering problems, there are very few convenient formulas that will provide rule-of-thumb answers in the practice of lubrication engineering. Hence, every effort has been made to present the various discussions with simple clarity and without resort to involved theories or mathematical analyses.

The description of current lubricating practices that have gradually evolved since 1883, when the true nature of an oil film was first discovered, includes practical material covering a wide range of subjects. Although space does not permit the inclusion of every type of mechanical operation, the principles of lubrication developed in the various chapters covering the more prevalent types of engines, machines, and major industries may be readily applied to special equipment.

The early chapters deal with the fundamentals of distillation, cracking, refining, and petroleum chemistry since a working knowledge of these subjects will be found helpful to a more complete understanding of the main discussions which follow. In later chapters the author has assumed that the reader is reasonably familiar with the general operating principles of various types of en-

Lubrication of Industrial and Marine Machinery. By William G. Forbes. Published by John Wiley & Sons, Inc., 440 4th Ave., New York, N. Y. 319 pages. Cloth binding, board covers. Price, \$3.50.

This book is designed to include information that may be used to explain and solve the everyday problems that arise in lubricating engines and machines of various types. Unlike the solutions to

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gines and machines. This does not mean, however, that technical knowledge is necessary to an understanding of the text.

The book includes a total of 36 chapters which are headed as follows: Distillation; Distillation of Lubricating Oils; Chemistry of Petroleum; Refining Light Distillates and Lubricating Oils; Blending; Dewaxing and the Effect of Wax in Lubricating Oils; Compounding; Tests and Specifications; Purchase Specifications; Effect of Heat and Pressure on Lubricating Oils; Effect of Metals on Lubricating Oils; Bearing Lubrication

and the Formation of Oil Films; Methods for Applying Lubricants; Ball and Roller Bearings; Steam Engines; Steam Turbines; Hydraulic Turbines; Air Compressors and Vacuum Pumps; Pneumatic Tools; Refrigerating Machines; Gas Compressors; Internal Combustion Engines; Gasoline Engines; Diesel Engines; Reduction Gears; Machine Tools; Steel Mills; Heat Treating Oils; Paper Mills; Textile Machinery; Wire Ropes and Cables; Hot Oil Circulating Systems; White Oils; Oil Purification and Reclaiming; Greases; Rust Prevention with Petroleum Products.

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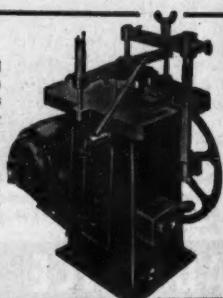
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According to the publishers, this volume should go far toward giving the earnest student an exact and expert knowledge of Diesel engineering and Diesel accomplishments.

FOR YOUR INFORMATION

"Win the War... But Plan for Peace" is the title of a 12-page brochure published by The Fostoria Pressed Steel Corp., Fostoria, Ohio. The brochure touches on a plan whereby industry can produce extensively those materials urgently needed today and yet can tie its production and sales operations more definitely with tomorrow. This is done by illustrating and describing how near infra-red equipment has adapted itself to diversified peace and war-time operations. Copy of brochure—Flashes No. 1043—free upon request.

"Rex-Flex and Bellows. A 36-page illustrated engineering manual on Rex-Flex Stainless Steel Flexible Tubing and Bellows has been issued by the Chicago Metal Hose Corp., Maywood, Ill. The manual contains numerous illustrations showing characteristics of these products in detail as well as tables of sizes, weights, wall thicknesses of the various wall forms, pressure data, and so on. Complete data on fittings are also presented, together with diagrams and instructions for attaching fittings and recommended design procedure for various types of applications.

A feature of special interest is a double-page spread presenting, in chart form, line-loss data on Rex-Flex Tubing and Elbows. Copy of Manual SS-44 free to design, production and maintenance engineers upon request.

January, 1944



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Clark Wall Chart. Production executives whose responsibilities include the hardness testing of metals will find the 24 x 32-inch wall chart now being offered by Clark Instrument Inc. especially useful. Attractively printed in three colors, with a minimum of advertising, the chart gives Rockwell, Brinell, Sciero, and Vickers hardness and tensile strength conversions for heat-treated steel. The type used is large and easily read at a distance of several feet.

Copy of chart can be obtained free of charge by addressing a request on company letterhead to Dept. MM, Clark In-

strument Inc., 10200 Ford Rd., Dearborn, Michigan.

"Millionths of an Inch for Sale by Vinci" is the title of a book issued by Vinci Corp., 8861 Schaefer Highway, Detroit 27, Mich., which presents, in color, groups of products manufactured by this firm, including plain cylindrical gages, straight-side spline gages, thread ring gages and masters, serration spline gages and masters, involute spline gages, and master gears, gear rolling fixtures, optical master inspection dividing head, cam comparator, master involute checker, spline and gear grinder, and angle tangent-to-radius dresser. Copy free to executives addressing a request on their company letterhead.



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Sterling Specification Selector. To aid in the selection of proper wheels for particular grinding problems, The Sterling Grinding Wheel Division of The Cleveland Quarries Co., Tiffin, Ohio, has prepared a handy booklet containing suggested specifications for Sterling portable wheels, internal wheels, centerless wheels, snagging wheels, segmental wheels, cut-off wheels, cylindrical wheels, and toolroom wheels. The booklet, which is designated as the Sterling Specification Selector, is conveniently indexed and is plastic bound so that pages lie flat when turned.

Copy of the Sterling Specification Selector is available to persons addressing a request on their company letterhead.

Gisholt Products Catalog. The entire line of Gisholt products, including turret lathes, automatic lathes, and balancing machines, is presented in "Gisholt Machines," a three-color 32-page picture catalog published by the Gisholt Machine Co., 1219 E. Washington Ave., Madison, Wis. The various types and sizes of machine tools are shown by means of large photographs accompanied by principal specifications and brief descriptions. Attention is drawn to Gisholt engineering services and complete manufacturing facilities through sections showing (1) typical special machines developed to meet specific and unusual tooling problems of individual manufacturers, and (2) various interior plant views.

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Champion Diamond Catalog. A four-page illustrated catalog of the various types of diamond tools manufactured by the Champion Diamond Co., 551 5th Ave., New York 17, N. Y., has been released by this firm. Copy free upon request.

Sundstrand Model 33 Fluid-Screw Rigid build for climb or conventional milling is the subject of a 20-page bulletin issued by the Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill. The bulletin clearly illustrates and describes the various construction features and operation of the machine and conveniently tabulates principal specifications. Copy of Bulletin No. 33-1 free upon request.

P&W Electrolimit Internal Comparators for accurately inspecting holes for diameter, roundness, taper, and bell-mouth are fully covered in a 20-page circular published by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. Among the various types of Electrolimit comparators illustrated and described are the Model E

internal, Model V internal, portable internal, No. 3A internal, multiple station (which is designed to not only check internal diameters but to give readings on concentricity, squareness of face, and taper as well), and universal internal. Photographs show various applications of the comparators. Copy of Circular No. 475 free upon request.

"Safeguarding the Woman Employee." The advent of women in plants and factories, performing jobs with ever-present physical hazards, has brought to the fore the problem of educating women workers in safe working methods. To assist the industrial executive in formulating a safety program designed to make the woman employee safety-conscious, the Policyholders Service Bureau of the Metropolitan Life Insurance Company has issued a report entitled "Safeguarding the Woman Employee."

Copies of this report are available to executives addressing a request on their company letterhead to Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, New York.

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The high speed steel hacksaw blade that's different. From end to end, each tooth is larger in pitch and height. The result is faster, easier, cleaner metal cutting. Order through your Mill Supply House or write for complete information.



It's a **Super-Sterling** Saw

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R-S Standard Bearing Covers. Bearing Appliance Division, R-S Products Corp., 4530 Germantown Ave., Philadelphia, Pa., has prepared for distribution a 12-page price list and data sheet—designated as Bulletin No. 12-BA—regarding R-S standard covers for ball and roller bearings. Copy free upon request.

Fostoria Model MF-240-N "Generalite" Fluorescent Unit for overall lighting of work areas and their surroundings is the subject of a four-page folder re-



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leased by The Fostoria Pressed Steel Corp., Fostoria, Ohio. Operating characteristics, construction, and so on, of the unit are fully illustrated and described. Copy of folder free.

Watson-Stillman Hydraulic Laboratory Presses. Bulletin 350-A now being issued by The Watson-Stillman Co., Roselle, N. J., presents the company's line of hydraulic laboratory presses and equipment for testing and experimental work. Copy of this eight-page, well illustrated bulletin will be sent free of charge to individuals addressing a request on their company letterhead.

Fellows No. 4 Fine-Pitch Gear Shaving Machine. The Fellows Gear Shaper Co., 78 River St., Springfield, Vt., has published a four-page circular which completely illustrates and describes the design and operation of its No. 4 fine-pitch gear shaving machine for shaving fine-pitch external spur and helical gears up to 4 inches pitch diameter and 20 diametrical pitch and finer. Copy free upon request.

Heron Estimating Table for Lathe Work. Prepared by Raymond Heron, 91-18 183rd St., Jamaica 3, N. Y., this booklet consists of instructions for finding the time required to machine a piece of work in the lathe, together with tables for estimating time in minutes required in machining work of a given diameter at various cutting speeds, using a feed of 0.001 inch.

Copies of the Heron Estimating Table are available at a price of \$1.00 each.

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"Whisticlean." A six-page folder containing complete information on a "buff-er-action" industrial cleaner and detergent for floors, building surfaces, equipment, and so on, to be known as "Whisticlean," is now being distributed by the American Oil & Disinfectant Corp., 88 Lexington Ave., New York, N. Y. Copy free upon request.

"Dust Collecting in Industry" is the title of a four-page folder released by Peters-Dalton, Inc., 628 E. Forest Ave., Detroit 1, Mich., which describes and illustrates various types of Hydro-Vhirl Dust Collectors, including a new orifice type, that are engineered to meet particular requirements in airplane motor manufacturing plants, foundries, machine shops, and so on. Copy free upon request.

Detroit Universal Hook Checker Bulletin No. HC-43. Published by the Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich., this eight-page, illustrated, four-color, technical bulletin de-

scribes a machine which is especially designed to enable operators, when sharpening thread milling cutters, gear hobs, and so on, to rapidly and accurately check whether or not the cutter has been ground to the correct angle of hook or rake, and to also check flute spacing.

Reed Micrometers. An eight-page folder illustrating and describing its complete line of Reed Micrometers and announcing a new policy of producing 1, 2, and 3-inch micrometers with verniers reading to ten-thousandths of an inch is now being distributed by the George Scherr Co., Inc., 130 Lafayette St., New York 13, N. Y. Copy free upon request.

Carboly Die Training Courses. Designated as the No. D-115, a 20-page booklet outlining the free training courses in carbide die servicing offered by Carboly Company, Inc. to selected individuals in any mill using cemented carbide dies is now being issued by this firm. Copy of the booklet can be obtained free of charge from Carboly Co., Inc., 11143 E. 8 Mile Rd., Detroit, Mich.



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**For clamping parts
of varying thickness.**



Model SA-500

**For clamping parts
of uniform thickness.**

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Both Speed Up Production!

Select a vise according to the character of the parts to be clamped and you'll be surprised to see how your production rate will jump. Less spoilage too—and that means lowered production costs!

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Eisler Bench Type Electric Spot Welders. A 28-page profusely illustrated bulletin now being distributed by the Eisler Engineering Co., 740 S. 13th St., Newark 3, N. J., describes the company's line of small bench type spot welding machines from $\frac{1}{4}$ to 3 kva. Operating principles, typical standardized arrangements, and special applications of these machines are explained and shown. The bulletin also contains information on a multitude of special welding tips and fixtures, as well as illustrations of automatic welding timers and contactors and numerous types of transformers manufactured by

the company. Copy of Bulletin No. 93-W-43 free upon request.

"War Production Data from the Houghton Line" Vol. II. Published by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa., this 36-page illustrated booklet contains factual information on metalworking, heat treating and machining of armament. The booklet includes articles entitled "Fighting Rust in a Global War," "Final Casing of High Speed Steel Tools," "Cutting Fluids for Magnesium Alloys," and "Circulating Quenching Oil." Copy free upon request.

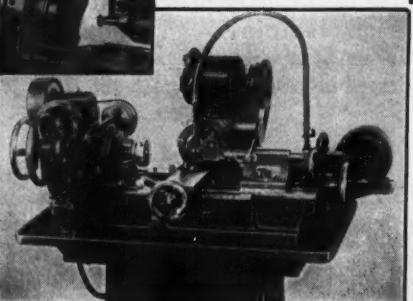


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Waltham Machine Works
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"The Heat Treating Furnace" is the subject of an interesting booklet published by Surface Combustion, Toledo, Ohio. Illustrated, this booklet is said to be especially designed for those who have only recently experienced the essentiality of heat treating and for those who have the tremendous job of converting war production lines to products for peace. Copy free upon request.

Carbide-Tipped Tools. A 56-page plastic-bound catalog and engineering manual of carbide-tipped tools is announced by Carbide Fabricators Co., Royal Oak, Mich. Contents of the manual range as follows: standard turning tools; taper shank machine reamers; straight shank machine reamers; taper shank expansion reamers; straight shank expansion reamers; shell reamers; centers; end mills; shell end mills; shell core drills; special tools; engineering data; price list.

Copy of manual will be sent free of charge to executives addressing a request on their company letterhead.



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Wesson Universal Vise for angular milling, grinding, and drilling is fully illustrated and described in a four-page folder now being distributed by Wesson Products Co., 709 Fisher Bldg., Detroit, Mich. Copy free upon request.

Seneca Falls Automatic Work Driver is the subject of Bulletin No. D-43 now being issued by the Seneca Falls Machine Co., Seneca Falls, N. Y. The bulletin illustrates and provides complete engineering data on 18 standardized models. Copy free upon request.

"Selecting the Right Tap for the Job." Published by the Greenfield Tap & Die Corp., Greenfield, Mass., this pamphlet is an attempt to tie together the basic relationships between tap and screw threads by providing explanations, suggestions, and tables which will enable the reader to readily select the correct tap he requires for a particular job at hand. Copies of this informative 20-page pamphlet are available free upon request.

"Exidust" Central Vacuum Cleaning Systems for industrial plants and buildings are treated in an eight-page bulletin by Allen Billmyre Co., 431 Fayette Ave., Mamaroneck, N. Y. The bulletin concisely outlines the advantages of these systems, explains the special features and details of Exidust equipment, and includes illustrations showing sectional views and typical installation layouts. Copy of Bulletin No. D-4 free upon request.

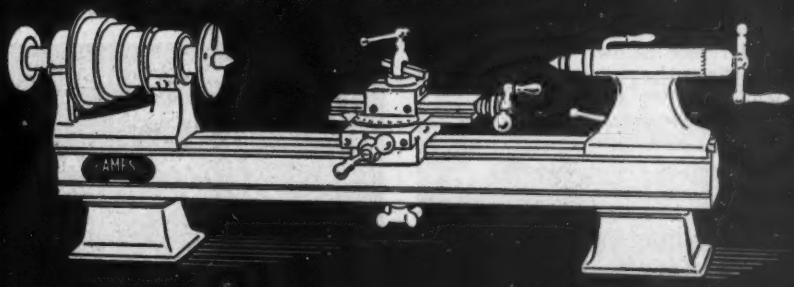
"Modernize Your (Railroad) Shop" is the title of a 16-page illustrated folder issued by The Cincinnati Planer Co., Cincinnati 9, Ohio, presenting the Cincinnati Hypro line of high production machine tools, including frog and switch planers, heavy duty die block planers, double housing planers, open side planers, vertical boring mills, planer type milling machines, combination planer and milling machines, and combination vertical boring, turning and milling machines. Particular treatment is given to the Cincinnati Hypro Frog and Switch Planer, the latest addition to the Hypro line. Copy of folder free upon request.

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Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8 $\frac{3}{8}$ " over bed. Available with motor drive.

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Grinding Wheel Dressers and Cutters. An eight-page catalog illustrating and describing its complete line of grinding wheel dressers and Huntington type cutters is now being distributed by the Calder Mfg. Co., 626 N. Prince St., Lancaster, Pa. Copy of Catalog No. 38 free upon request.

Mattison No. 135 Backstand Idler is the subject of a four-page circular prepared by Mattison Machine Works, Rockford, Ill. In addition to illustrating and

describing the design of the unit, the circular also shows and explains how the Mattison No. 135 Backstand Idler permits present grinding and polishing lathes to be easily adapted to the use of factory-coated abrasive belts. Copy free upon request.

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ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance: .001, .005, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder. Spacers, Gaskets, Shims IMMEDIATE DELIVERY

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**Transfer Points Insure
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A real helping hand! Heimann Transfer Screws are quick, accurate markers in setting dies. No wrench needed. Six hardened screws nested in holder (see below). Uniform height hex base to point, insuring clear uniform indentations.

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Regent Selective Automatic Feed Facing and Boring Head. A four-page bulletin now being issued by the Paper Converting Machine Co., Green Bay, Wis., illustrates and describes an automatic feed facing and boring head for use on horizontal boring bars in performing facing, outside turning, and boring operations. Copy free upon request.

Carboley Tipped Scrapers for rough and finish surface scraping are described and illustrated in four-page folder now available free of charge from Cliff J. Forthman, 1633 Elkton Place, Cincinnati, Ohio.

"3-M Abrasive Specialty Items" is the title of a manual issued by the Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn., showing the latest types of abrasive shapes and forms that have been devised for grinding and finishing metal. 3-M abrasive specialty items include belts, Evenrun bands, cones, sleeves, cartridge rolls, overlap slotted discs, slotted discs, and pyramid discs.

Packed with photographs, the manual shows the various products in actual use in finishing a variety of items from huge ship propellers to the smallest machine part. Valuable suggestions on the finishing of workpieces are included in the manual, copy of which is available free upon request.

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Tantung Tool Catalog. Published by Vascoloy-Ramet Corp., North Chicago, Ill., this 28-page catalog describes Tantung—a nonferrous cast alloy for metal cutting—and lists the line of Tantung tools marketed by the company, including square and rectangular solid tool bits, all purpose tools, economy tools, cut-off blades, milling cutter blades, shell and mills, solid end mills, boring tools and rounds, and form tools. In addition, the catalog contains valuable information on the performance of Tantung tools, grinding and brazing of Tantung, proper use of Tantung tools, Tantung grades, and so on.

Copy of Catalog No. 227 will be sent free of charge to persons addressing a request on their company letterhead.

"Practical Measurement of Surface Roughness" is the title of an eight-page bulletin published by Physicists Research Company, concerning its Type Q Profilometer. In the first part of the bulletin, answers are given to the questions "What is surface roughness?" and "Why measure surface roughness?" The remainder of the bulletin describes the Type Q Profilometer and its use in the production measurement of surface roughness, as well as available Profilometer accessories.

Copy of the bulletin may be obtained without charge by writing to Physicists Research Co., Dept. 6, Ann Arbor, Mich.

"An Introduction to Postwar Planning." In line with one of the major interests of business today, the Policyholders Service Bureau of the Metropolitan Life Insurance Company has issued as the first of a series of projected reports on the subject of postwar planning one entitled "An Introduction to Postwar Planning." This report is designed to put before business executives information that will, first, assist them in determining the need for postwar planning within their own organizations and, second, help them to define more accurately the scope of postwar planning activities that will best meet the needs of their own situations.

Copy of the report is available to executives addressing a request on their company letterhead to Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, New York.

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"80 Years" is the title of a very interesting book published by the Ferracute Machine Co., Bridgeton, N. J., manufacturer of power presses, press brakes, and special machinery, dealing with the career of the company from its establishment in 1863 up to the present time. Dedicated to the men and women of Ferracute who are serving their country in the armed forces and on the home front, the book includes a wealth of scientific fact as well as human interest. Copies are available to industrialists or executives upon request.



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Speeds layout on all metals. Clean, accurate detail.
Oil resistant. Won't chip, crack or flake off. Also ideal
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"Preventing Welding and Cutting Fires." To instruct users of welding and cutting equipment in reducing potential fire losses, the International Acetylene Association has prepared a 16-page pocket-size booklet entitled "Preventing Welding and Cutting Fires." Written in an easy-to-understand manner, the booklet contains brief, clear discussions of the chief causes of fires and practical common-sense measures for preventing them.

Copies of this booklet should be placed in the hands of all welding and cutting operators, and may be obtained in reasonable quantities without charge directly from the International Acetylene Association, 30 E. 42nd St., New York 17, New York.

"Backgrounds." Metallurgists and engineers will be interested in Vol. 3, No. 1 of "Backgrounds" which is published at regular intervals by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. The current issue is devoted to the electron and its place in the world of the future.

Although the subject is one which can really only be understood by trained scientists, it is presented in a simple but highly interesting manner—in fact, the simplest and most effective exposition of the electronic theory that this writer has ever seen. The text deals with one phase after another of the electron's activities and the part it plays in modern electric gaging, induction heating, the electronic microscope, and so on.

The issue also contains some interesting stories about the work that Pratt & Whitney is doing and the interesting equipment used in the performance of its tasks. Copies are available to scientists, metallurgists, and engineers or plant managers.

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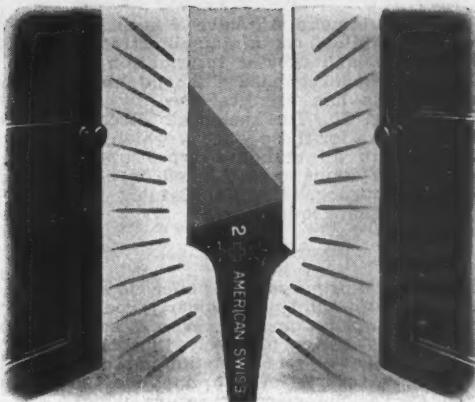
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The Finishing (or Stripping) File is really a big brother to the Pillar File, for it has the same rectangular section and parallel width, with double-cut sides and safe edges. Its comparatively heavy proportions and its large sizes (8-in., 10-in. and 12-in. lengths) make it particularly suitable for general filing and on lathes.

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Di-Met Diamond Abrasive Wheels. A 24-page catalog containing illustrated, descriptive, and tabular information on Di-Met resinoid bonded diamond abrasive wheels has been released by the Felker Mfg. Co., Torrance, Cal. Recommended uses for these wheels, which are available in all standard types up to 6 inches in diameter, are listed on page 9 of the catalog. Copy of Catalog No. 43-3 free upon request.

Norton Multipurpose Grinder is the subject of an eight-page folder prepared by the Norton Company, Worcester 6, Mass. The folder profusely illustrates and describes several outstanding construction features of the machine, as well as various grinding setups which can be made on the machine for grinding adjustable reamer, gear cutter, heavy duty face milling cutter, circular form tool blank, aircraft engine part, thrust bearings, and so on. In addition, complete specifications of the machine, which is available in three sizes, are listed. Copy of folder free upon request.

Universal Nubon Grinding Wheels. Complete information on Universal Nubon custom made precision grinding wheels is contained in a 72-page booklet published by the Universal Wheel & Abrasive Corp., 2626 W. Van Buren St., Chicago, Illinois.

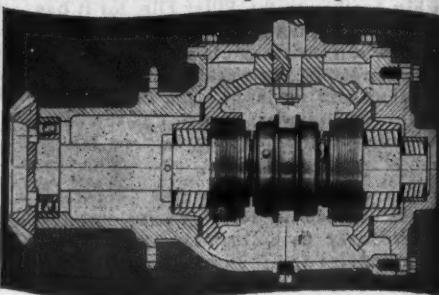
In the interest of standardization and to enable the user to visualize at once the wide range of types of grinding wheels, there are shown in the booklet cross sections of the nine standard types which are representative of practically all grinding wheels used on the standard makes of grinding machines. These nine types of wheels are numbered and each dimension designated by letter. This classification of grinding wheels greatly simplifies the stocking of wheels wherever a quantity is kept on hand. It also enables the user to accurately order a grinding wheel by giving the type number and the complete dimensions necessary to construct such a wheel, as designated by the cross section of that type.

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They show and describe how the PULLMORE Multiple Disc CLUTCH is so compactly installed in a hoist gear case that it helps reduce size and weight — while providing safe, smooth, rapid operation. Give dimensions, capacities and specifications. Show how exclusive PULLMORE features are being used to engineer a wide range of ahead-of-competition products.



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Quality Mass Part Production Is Coming

From an editorial in the November, 1943, issue of
"Screw Machine Engineering".

Our industry can never turn back to the days when the *quantity* of parts turned out per machine was the dominating factor. It is still important to machine units at minimum cycle time, but the *quality* of these parts is, and must continue to be of equal or greater concern—and quality will continue to predominate all other phases of mass part production for years to come.

MODERN COLLET CAN HELP YOU MEET TOMORROW'S COMPETITION IN

Screw Machine Production

It is—and for many years has been—Modern Collet's business to work with you in keeping your screw machines operating efficiently. If your machines have seen more than their share of service . . . are of older models or are simply generally worn out . . . they can be completely rebuilt and modernized by the most thorough methods ever developed for this type of work.

If spindle carriers alone require modernizing, Modern Collet offers this specialized service. When individual parts require replacement, complete lines of parts—many of exclusive, up-to-the-minute design—are available. And included in the lists of Modern Collet stock items are many of the screw machine tools which are more widely used than any others manufactured today.

The efficiency of your screw machines may be a most important factor in your ability to meet future competitive situations. Why not talk to a Modern Collet representative today about what can be done to improve the operation of your present equipment.

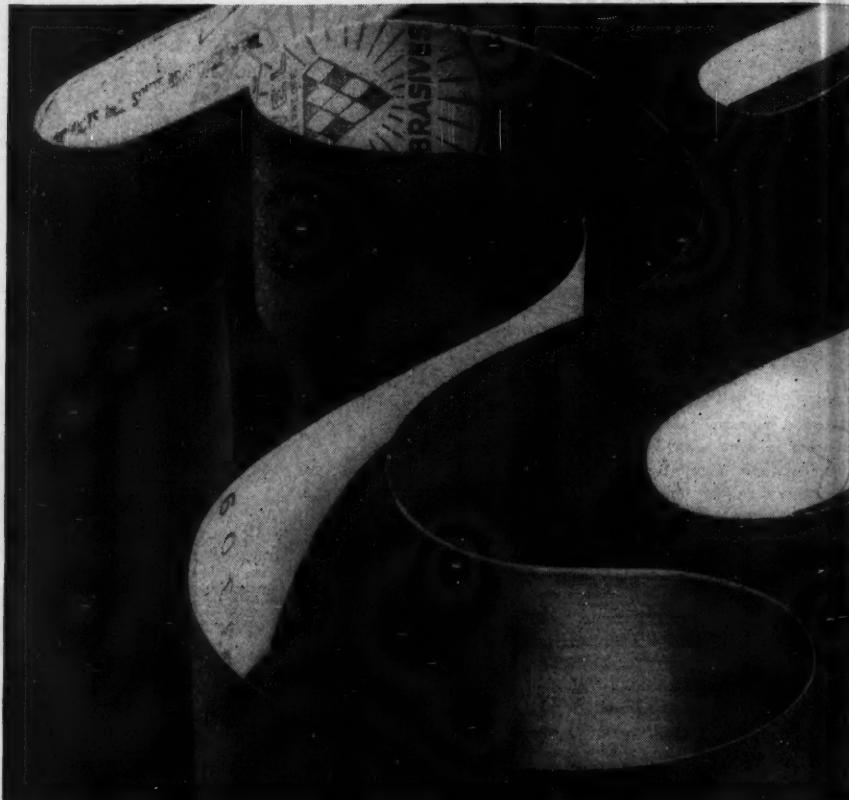


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KNURLED SOCKET HEAD CAP SCREWS

Their knurled socket heads just naturally help speed assembly work . . . providing a non-slip grip for greasy fingers . . . permitting the screw to be turned faster and farther before a wrench is needed. Yet you pay no more for this added time-saving feature when you buy the Knurled "Unbrako." Why not order some "saved time" today?

SELF-**UNBRAKO** LOCKING HOLLOW SET SCREWS

Another time-saver . . . helps prevent machine breakdowns caused by the ordinary set screw working loose. When tightened as usual, knurled point digs in . . . holds tight against vibration, yet can be used over and over. Sizes: No. 4 to 1/2" diam. . . Write for "Unbrak" Screw Catalog.

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Enable you to work with heavier loads, make deeper cuts at higher speeds because they rotate with the work. Precision bearings built for close precision work. Four Interchangeable Inserts Available.



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Combines Magnetic Chuck with "AC" Rectifier. Operates from any electrical outlet. Holds work rigidly without clamps or vises.

ELECTRIC TACHOMETER

Checks RPM instantly. Used as "Hand Type" or with generator separated from meter as "Separable Type." Two Sizes—0 to 2500 RPM and 0 to 5000 RPM.

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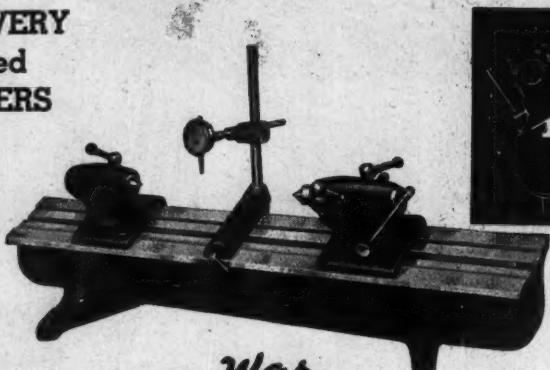
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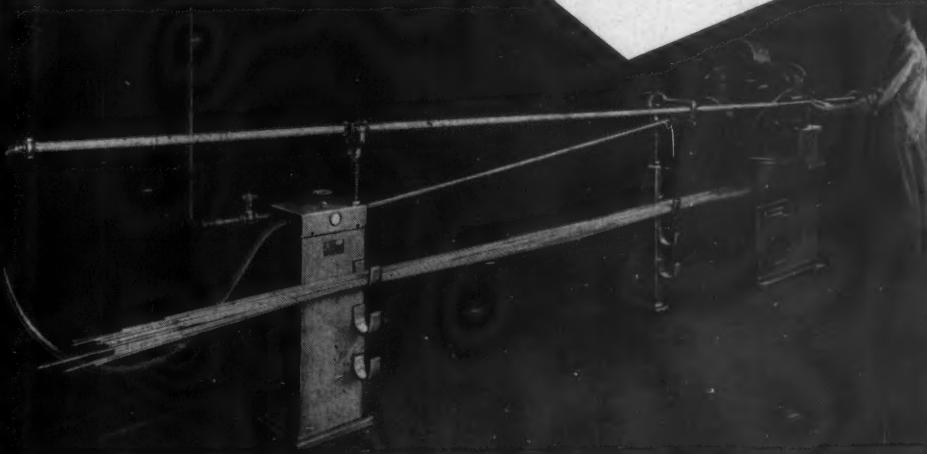
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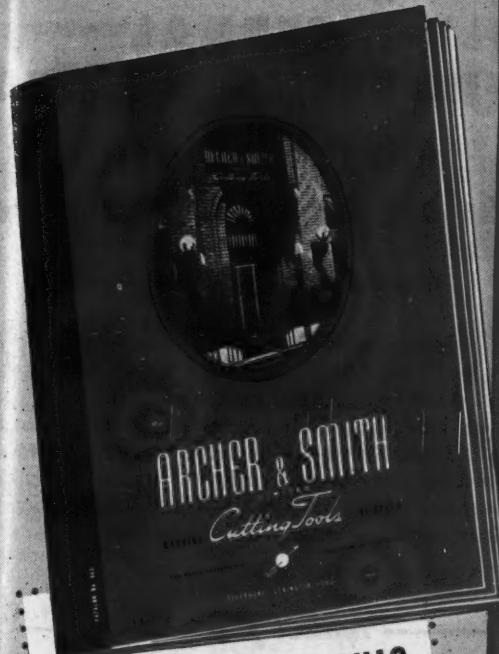
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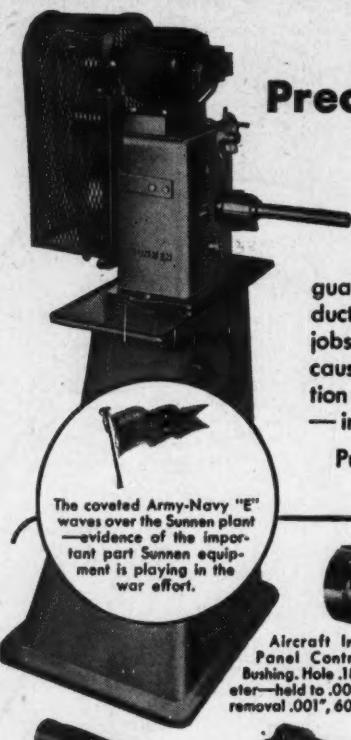
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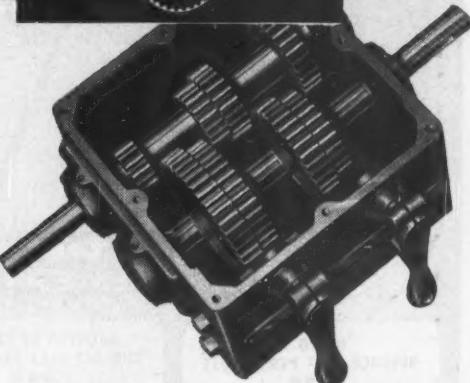
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TRIPLE THREAT PRODUCTION STAR

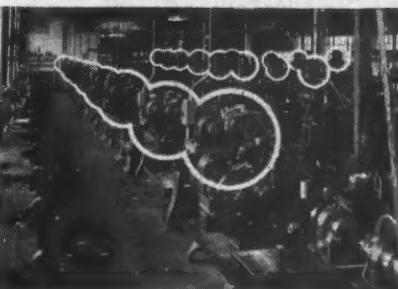
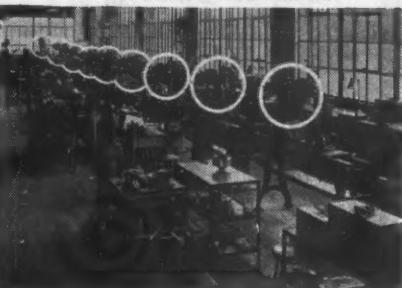
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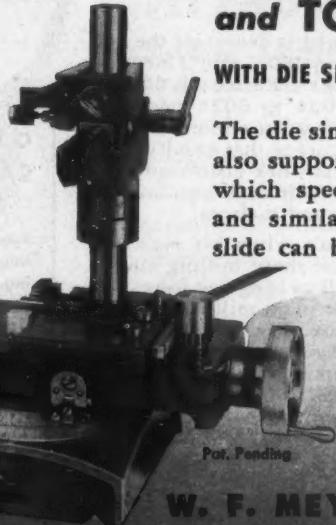
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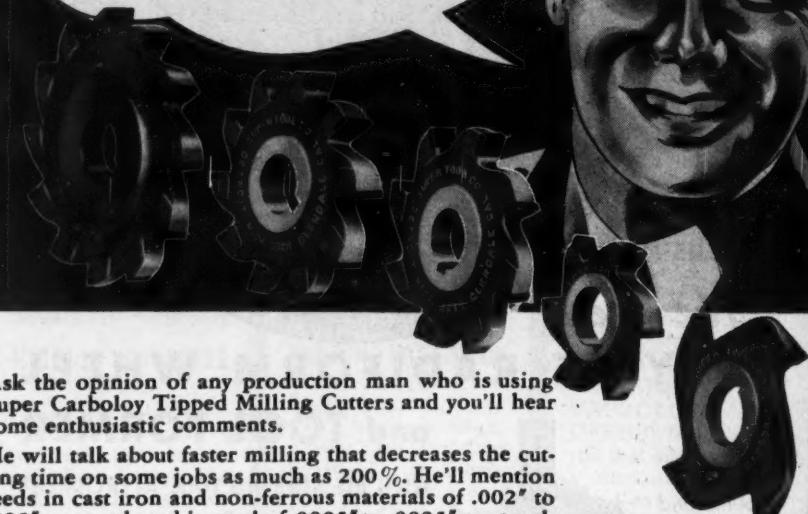
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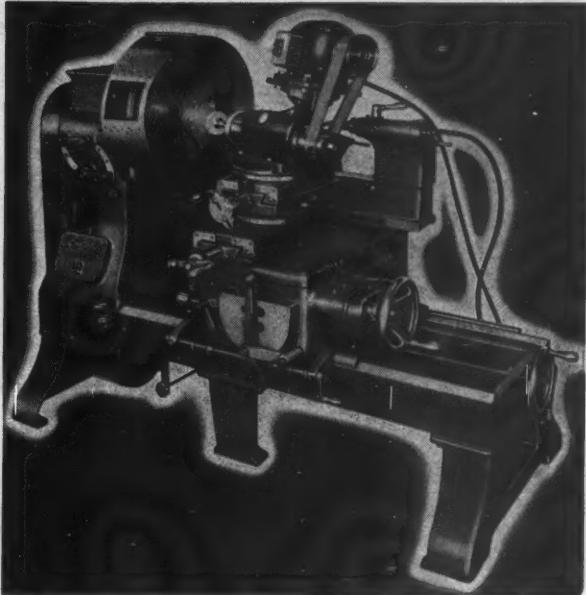
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Three types pictured above
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**MODEL HGX GRINDERS
\$3750
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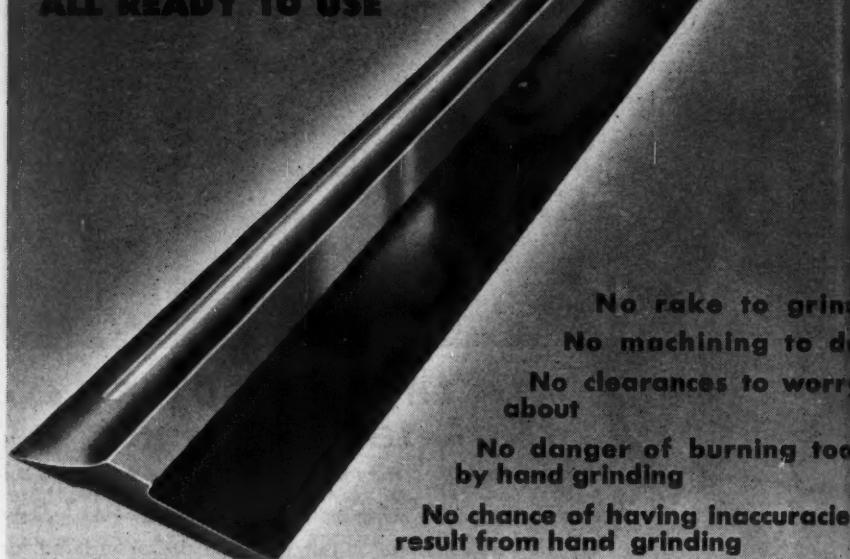
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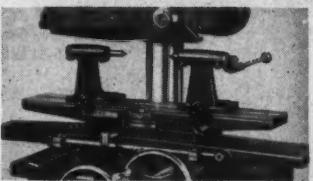
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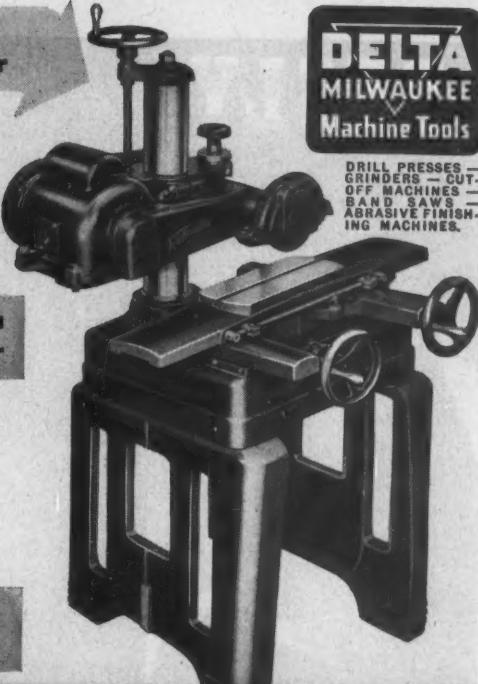
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Consult your Delta distributor or write for bulletins.

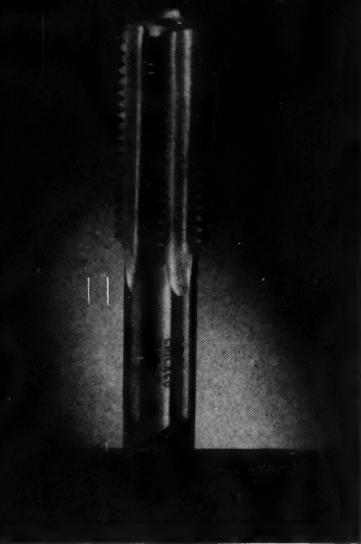
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TOOL AND CUTTER
GRINDING**

*The
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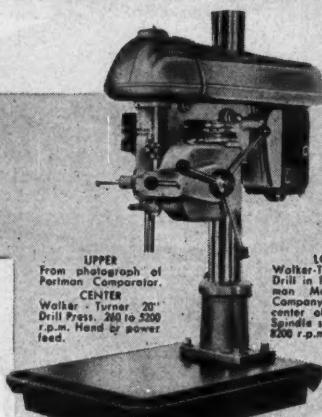
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CAST IRON
& Non-Ferrous Metals

For Cutting
STEEL

BIG little things with JOBS



Ultra smoothness and extreme accuracy in the mechanical world mean more efficient operation, more dependability, longer life.

It is the *forte* of honing and superfinish stones to create ultra smoothness and extreme accuracy; to create those physical attributes far beyond the capacity of anything else man has yet contrived.

MID-WEST MICRO BOND honing and superfinish stones have blazed many new trails in the field of superfinishes and extremely close tolerances. Many of Uncle Sam's weapons of war—tanks, guns and planes—owe a portion of their deadly efficiency to a MID-WEST honing or superfinish stone often smaller than a match. Truly such tiny items are little things with big jobs!

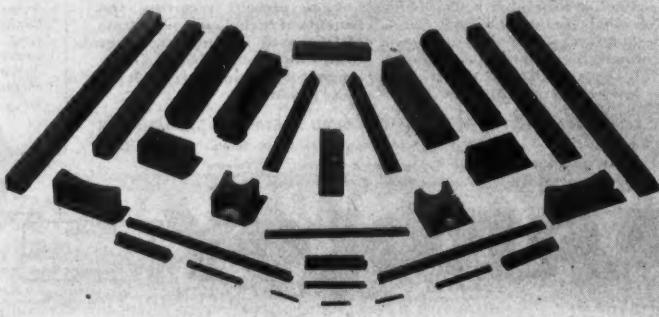
MID-WEST honing and superfinish stones—the world's *most efficient abrasives*—come in any size, any shape, any grain, any grade. They last longer, cut faster and produce smoother surfaces with less heat.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. Milwaukee Avenue Detroit 11, Michigan

MID-WEST'S complete line of abrasive products also includes grinding wheels for any purpose, coated abrasives of any type and compounds. Let a MID-WEST service engineer tell you what MID-WEST abrasives have done for others. You'll be amazed!



KENNAMETAL!

5

KM

Rockwell 90.8 A—
Strongest crater re-
sistant grade, for
roughing cuts on
carbon and alloy
forgings, bar stock,
tubing, etc., with
carbon content
of .30% and
above.

K3H

Rockwell 91.8 A—Harder than KM but not as
strong. K3H, the most crater resistant grade,
is recommended for finishing or moderate cuts
on carbon and alloy steels .30% carbon and
above, and also for general use on soft steels
containing less than .30% carbon. Used widely
for milling of steels.

K4H

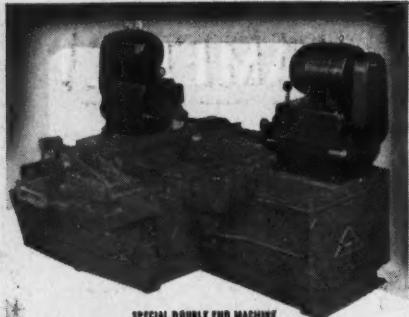
Rockwell 92.3 A—More resistant to edge wear than
K3H but not as crater resistant. For precision boring
and light finishing cuts on all steels. Very good for
tools requiring large nose radius or where tool
must dwell without cutting. Used widely for
milling and extremely rough cutting of non-ferrous
and non-metallic materials.

K2S

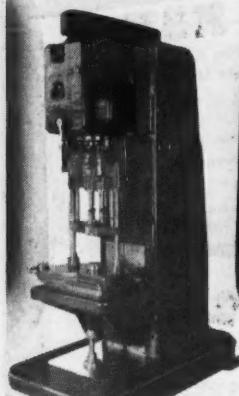
Rockwell 91.5 A—A strong
grade better able to withstand
abrasion and sand inclusions than
KM, but not as crater resistant.
For roughing steel castings
and for very rough cuts on
cast iron.

Rockwell 92.1 A—A straight
Tungsten Carbide grade, more
abrasion resistant than K4H,
but with less impact resis-
tance. For general use on cast
iron, non-ferrous and non-
metallics.

SUPERIOR CEMENTED CARBIDES



SPECIAL DOUBLE END MACHINE



STANDARD PRODUCTION TYPE DRILL.
2 SIZES



STANDARD SINGLE END AUTOMATIC INDEX MACHINE

We invite inquiries
regarding postwar plans.

BUY
WAR BONDS

L & *M*air & TOOL & MFG. CO.
2659 S. TELEGRAPH ROAD. ▲ DEARBORN, MICHIGAN.
ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

IT'S SIMPLE
"To Make"
A MACHINE NOW
—if You Have a
TWIN RAM MASTER UNIT

A COMPLETE
SELF-CONTAINED
HYDRAULIC
POWER UNIT

YOU CAN change this unit from one base to another, or rearrange your setup on the same bed, as your requirements dictate. It's practically as flexible as a motor; only pick-off gears necessary for speed changes—units provide infinite feeds. Twin Ram Unit can be used for wide range of applications—drilling (single or multiple spindle), reaming, boring, counter-boring, spot-facing. Uniform pressure behind load is always in a straight line—the two rams prevent twisting action. Two sizes available. Capacity up to 2" in steel. Can be made to operate manually or automatically by remote control—for either right or left hand operation—with spindle rotation in either direction.

Send for folder giving complete information—spindle speeds and feed rates.



LEADS!

**The Only Outstanding Improvement
In Tumbling in 50 Years**



*T*ODAY in hundreds of plants, Roto-Finish is making tremendous time and labor savings on a wide range of work.

Roto-Finish can be varied from a severe grinding action to the finest surface finishing. It is being used on castings up to 75 pounds . . . and on delicate, intricate small parts weighing but a fraction of an ounce—parts never before successfully finished mechanically.

Ask us to process sample parts for you—free, of course.

THE STURGIS PRODUCTS CO.
274 JACOB STREET, STURGIS, MICHIGAN

Who said
"GREEN HELP"?



Courtesy of Vega Aircraft Corp.

- The new worker isn't a stranger to the intricacies of aircraft bending very long—not with a Buffalo Aircraft Type Bending Roll on the job. By means of simple manipulation of easy-working controls, this specially designed Buffalo Bending Roll handles the most difficult bending of arcs, circles and

spirals. It's practically automatic! Inexperienced operators are quickly trained, turning out accurately formed stock on a brisk production basis—and with a minimum of fatigue. These tools—embodying all the principal features required by aircraft builders are available in a range of sizes. Data in bulletin 3344.

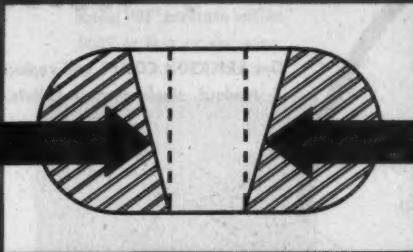


BUFFALO FORGE COMPANY
388 BROADWAY
BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" AIRCRAFT TYPE BENDING ROLLS

Two

NON-PARALLEL SURFACES

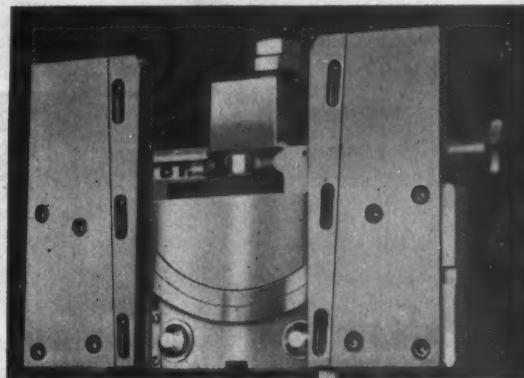


Broached
USING THIS
One FIXTURE

ANOTHER EXAMPLE OF HOW DETROIT BROACH ENGINEERS DEVELOP NEW APPLICATIONS IN BROACHING

The fixture shown here was designed and built by Detroit Broach Company to provide the necessary rigidity and at the same time provide a means for turning the part several degrees. Thus it is possible to broach non-parallel surfaces in one stroke of the ram.

It is work of this kind that has made Detroit Broach Company famous throughout the country for doing things with broaches that others have called impossible. Broaching can increase speed... improve accuracy... in many manufacturing operations. Broaching will solve many of your production problems. Write Detroit Broach Company today.



DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE
9308 SANTA MONICA BLVD.

DETROIT, MICHIGAN
BEVERLY HILLS, CALIFORNIA

The Collet that "Makes" Precision



Collapses 1/32 in.—Retains Gripping Strength and Accuracy.

Collet open at both ends.

PRINCIPLE

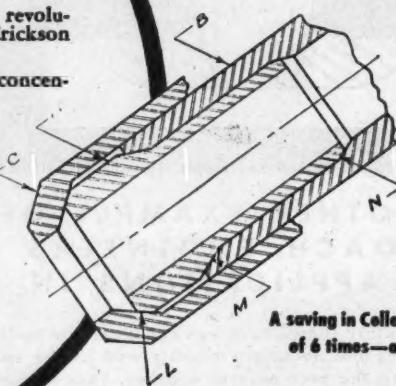
The drawing (right) illustrates the revolutionary principles embodied in the Erickson Precision Collet Chuck.

Collet "A" is automatically lined up concentrically with the axis of the Shank "B" by two Cam Surfaces of the Collet "M" and "N" mating with the Cam Surfaces of Shank. The Shank and Collet Cam Surfaces are mated to within .0001 inch.

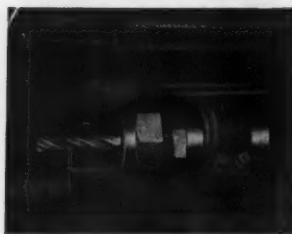
This action aligns Collet with the Axis at the Center of Shank, allowing it to be drawn back by Collet Cam Surface "L" and Nose Piece "C".

Due to the fact that collet is open slotted at both ends, Collet "A" then collapses equally throughout its length to maintain a vise-like grip and remain in perfect alignment with the Axis of Shank.

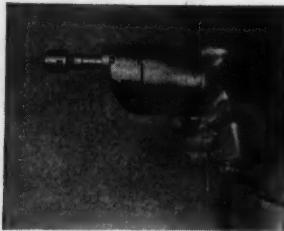
One ERICKSON COLLET will replace 7 standard, single purpose Collets.



A saving in Collet expense of 6 times—or more.



Model 402 Chuck in use on Automatic Screw Machine. Drill gripped on flutes.



Special Model 202 Chuck used in Hand Drills in Aircraft Industry. 01 Models are regularly recommended for Hand and Air Drills.



Model 201 used in drill press. Extra long drills can be used, by extending them from the chuck as they wear.

Send for Bulletin E giving complete information and additional photographs of uses

ERICKSON STEEL COMPANY

The ERICKSON COLLET CHUCK**

Model "01" accurate within .0005 or less at the nose.



Models 102 and 402 Chucks in use on Automatic Screw Machine.



Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.

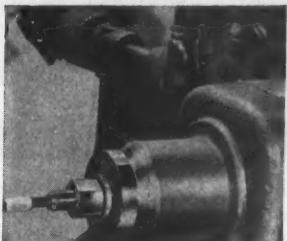


Model 102 Chucks for drilling and tapping operations on Turret Lathe. Jobbers Drill stubbed on chuck in foreground.

Model "02" accurate within .001 or less at the nose.



Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.



Model 301 Chuck designed for high speed internal grinding operations.



Tool Post Grinder equipped with Model 301 Chuck.

2309 Hamilton Ave., CLEVELAND 14, OHIO

NEW

TAMALOY DIAMOND HONES

1. Tools easily honed—kept highly polished—before each shift or with tool in machine—cuts down on carbide-tool grinding.
2. Keeping tools sharp saves set-up time in changing to new tools, speeds machine output and reduces work spoilage.
3. Tamaloy Hones are long-lasting. Diamonds set in tungsten carbide resist wear. Carbide matrix prevents diamonds from falling out when rubbed against hard surface or edge.
4. Supplied in three grades—rough, medium and fine or 100, 150 and 200 grit.

• ASK FOR PRICES AND OTHER DETAILS •

TUNGSTEN ALLOY MFG.
CO.

100 GOLDEN STREET, NEWARK, N. J. formerly Circle Tip Tool Co.

*It's a
New Year's
Question*

**WHY GET A
WELLS NO. 8?**



WELLS No. 8

Capacity: Rectangle—8" x 16"
(spec. bowed guides)—5" x 24"
Rounds—8" dia.
Speeds: ft. per min. 60, 90, 130
Motor—Specifications optional



No. 20

Designed for cutting
heads of propeller
blades



No. 12

Heavy duty produc-
tion saw



No. 9

General Foundry
Saw



**STOCK
STANDS**

Indispensable item for
your shop



Wells Saws
THE SIZE OF SERVICE

Here's why!

VERSATILE — Wells No. 8 Metal Cutting Band Saw will cut a wide variety of metals in various shapes. In single or ganged-up work it will take overall sizes up to 8" x 16" rectangles or 8" rounds.

ACCURATE — Vibrationless operation assures uniform cutting.

FAST — The continuous cutting method employed insures a cool blade thus enables the operator to obtain maximum cutting speed for the type of stock being cut. Adjustable to 3 speeds.

ECONOMICAL — Cutting capacity and quality are paramount factors in choosing a WELLS Saw. Then too, it requires but a 1/2 H.P. motor and 2' x 6' of floor space.

Ask your mill-supply dealer to show you a WELLS Model 8, in actual operation — you'll like its performance.

A large stock of blades is available at all times

To get complete specifications on WELLS Saws, write for the new WELLS Catalog.

Wells Has Established Leadership

WELLS MANUFACTURING CORPORATION

Wells **METAL CUTTING**
BAND SAWS

BOB TYLER ST. • THREE RIVERS, MICHIGAN

New **ABRASIVE**

B-11

PLAIN MILLING MACHINE

ALL ELECTRICAL CONTROL

SAFETY FEATURES

LEADER MAILING
IN EITHER DIRECTION

ASY TABLE TRAVEL
OF 300" A MINI

ABRASIVE

ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL CO. EAST PROVIDENCE, 14, R. I. Dealers in Principal Cities



HANNA CYLINDERS

... where you need
SMOOTH, DEPENDABLE
power ...

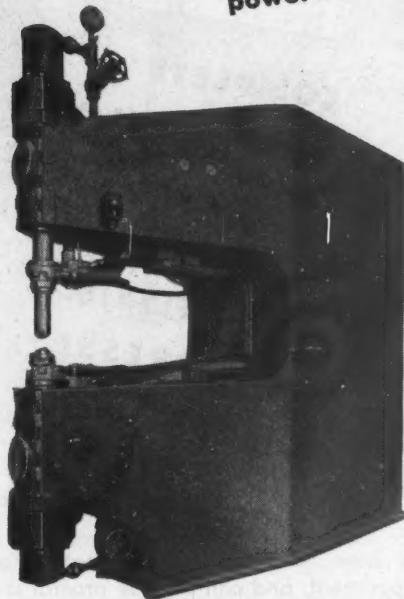
• Temp-A-Trol Spot Welder, manufactured by the Progressive Welder Company, Detroit, which employs two Hanna Hydraulic Cylinders.

..... Spot Welding machines for example

Two Hanna Hydraulic Cylinders supply controlled power for this Progressive Temp-A-Trol Spot Welder—helping it produce "heat-treated" welds consistently.

The machine operates like this: the 1st of five stages, Hanna Cylinders advance the electrodes at low pressure until they contact the work. 2nd, Hanna Cylinders apply medium pressure to make the weld. 3rd, Under high pressure, and with the current off, material is literally forged together. 4th, At reduced heat and medium pressure, stresses in the material are relieved. 5th, Electrodes return to home position under low pressure. The complete cycle is fully automatic—current and pressure regulated by a thermocouple in the electrode.

This example of the versatility and adaptability of Hanna Cylinders is just one of 1001 ways in which Hanna Cylinders are used to ad-



vantage on machines and equipment. There is a standard Hanna Cylinder for nearly every conceivable application involving a pushing, pulling, lifting, pressing or clamping action. Their simple, compact design, and smooth dependable power make them ideal components of modern machines.

Investigate the advantages of using Hanna Cylinder power on the machines and equipment you design and build. A Hanna engineer will be glad to help you.

• Send for these catalogs—
233: Hanna Hydraulic
Cylinders.
230: Hanna Air Cylinders ...
They give full data.



HANNA ENGINEERING WORKS

1765 ELSTON AVENUE

CHICAGO, ILLINOIS

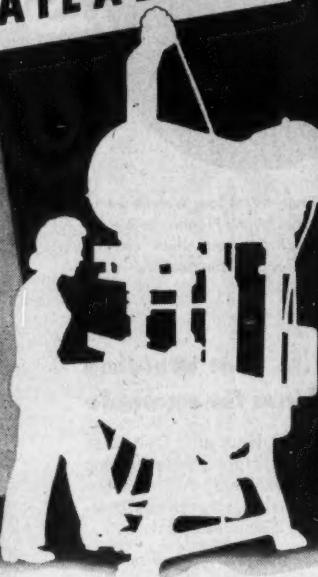
Air and Hydraulic
RIVETERS

Air and Hydraulic
CYLINDERS

Air
HOISTS

NOW AVAILABLE

COMPLETE
REBUILDING
SERVICE
FOR
GENERAL FLEXIBLE
POWER PRESSES



We have now acquired sufficient capacity to reopen our rebuilding department, and can provide prompt service to any owner of General Flexible Power Presses.

Rebuilding includes complete overhaul—replacement of worn or broken parts—resurfacing—refinishing—all other operations needed. We use the same skilled workmen, the same methods and standard parts as on new machines.

In most cases we can restore G.F.P. Presses to their original productivity and operation.

Discuss this with our representative in your area, or write us direct.

GENERAL MANUFACTURING COMPANY

6438 FARNSWORTH AVE. • DETROIT 11, MICH.

GENERAL *Flexible*
POWER PRESS



Adjustable REAMERS

*RUGGEDNESS for long life, heavy cuts

RUGGED construction, along with the inserted blade feature, is another Wetmore characteristic that means lower machining costs through long life and the ability to take heavy cuts.

Reamer and Boring Bar parts are made of the highest quality alloy steel, specially heat-treated for strength, toughness and long life. Standard blades are high-speed steel, with special heat treatment to insure long life and low cost per hole. Cast alloy or tungsten carbide tipped blades are also furnished.

Wetmore tools are used in top-flight metal-working plants all over the country because they have a combination of design features found in no other reamers or boring bars. Let us help you solve your production problems.

STOCK DELIVERY

Wetmore standard Reamers are now available from stock for quick delivery; and unusually good delivery is made on Boring Bars and special tools. Phone, write or wire.

ETMORE REAMER CO.
N. 27th Street • Dept. E
MILWAUKEE 8, WIS.

Write for New Catalog





More production per man hour is being obtained in war plants using Niagara Power Squaring Shears. Convenient operation, quick, accurate setting of ball bearing, self-measuring parallel back gage, full visibility of cutting line, instant-acting Niagara sleeve clutch and complete accessibility at rear are some of their modern features. Built in a complete range of capacities and sizes, Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices: Detroit, Cleveland, New York.

Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory re-grinding service by the same skilled men who grind new Niagara knives.

BUY UNITED STATES WAR BONDS AND STAMPS

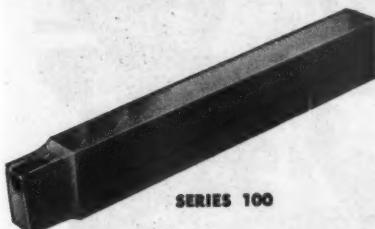
PROMPT DELIVERY

Tungsten Carbide Tipped Tools

Price \$1.00 Each In Any Size

New Low Prices—Increase Production—Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.



SERIES 100

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	$\frac{1}{4} \times \frac{1}{4} \times 2$
R-101	L-102	$\frac{1}{8} \times \frac{1}{8} \times 2\frac{1}{4}$
R-103	L-104	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
R-105	L-106	$\frac{1}{8} \times \frac{1}{8} \times 3$
R-107	L-108	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{4}$

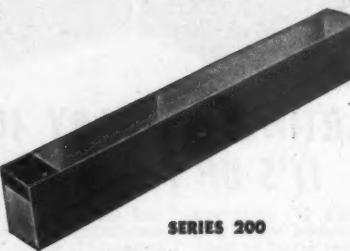
Below—

300 Series

Tool No.	Shank Size
300	$\frac{1}{4} \times \frac{1}{4} \times 2$
301	$\frac{1}{8} \times \frac{1}{8} \times 2\frac{1}{2}$
302	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
303	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{4}$

200 Series

Tool No.	Shank Size
200	$\frac{1}{4} \times \frac{1}{4} \times 2$
201	$\frac{1}{8} \times \frac{1}{8} \times 2\frac{1}{4}$
202	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
203	$\frac{1}{8} \times \frac{1}{8} \times 3$
204	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{4}$



SERIES 200

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.



SERIES 300

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

VICTOR MACHINERY EXCHANGE, INC.
251 CENTER STREET Phone: CANal 6-5575 NEW YORK, N. Y.



STARTING JANUARY 18th IT'S UP TO YOU!

STARTING January 18th, it's up to you to lead the men and women working in your plant to do themselves proud by helping to put over the 4th War Loan.

Your Government picks you for this job because you are better fitted than anyone else to know what your employees can and should do—and you're their natural leader. This time, your Government asks your plant to meet a definite quota—and to break it, *plenty!*

If your plant quota has not yet been set, get in immediate touch with your State Chairman of the War Finance Committee.

To meet your plant quota will mean that you will have to hold your present Pay-Roll Deduction Plan payments at their peak figure—and then get at least an average of one **EXTRA \$100 bond from every worker!**

That's where your leadership comes in—

and the leadership of every one of your associates, from plant superintendent to foreman! It's your job to see that your fellow workers are sold the finest investment in the world. To see that they buy their share of tomorrow—their share of Victory!

That won't prove difficult, if you organize for it. Set up your own campaign right now—and don't aim for anything less than a 100% record in those *extra \$100 bonds!*

And here's one last thought. Forget you ever heard of "10%" as a measure of a reasonable investment in War Bonds under the Pay-Roll Deduction Plan. Today, thousands of families that formerly depended upon a single wage earner now enjoy the earnings of several. In such cases, 10% or 15% represents but a paltry fraction of an investment which should reach 25%, 50%, or more!

Now then—Up and At Them!

Keep Backing the Attack!—WITH WAR BONDS

This space contributed to Victory by MODERN MACHINE SHOP

*This advertisement prepared under the auspices of the United States Treasury Department
and the War Advertising Council*

LONG LENGTH
HIGH SPEED DRILLS
 9" Cutting Flute
 12" Long



Prompt Delivery

Size Inches	Length Overall Inches	Length of Flute Inches	Our Price Net Each High Speed
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9/64	12	9	3.00
5/32	12	9	3.00
11/64	12	9	3.00
3/16	12	9	3.00
13/64	12	9	3.25
7/32	12	9	3.25
15/64	12	9	3.25
1/4	12	9	3.50
17/64	12	9	3.50
9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
3/8	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
29/64	12	9	4.75
15/32	12	9	4.75
31/64	12	9	5.00
1/2	12	9	5.00

VICTOR MACHINERY EXCHANGE, INC.
 251 CENTER STREET Phone: CANal 6-5575 NEW YORK, N. Y.

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MACHINE WORK • CASTINGS • HEAT-TREATING
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Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.

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AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

... up to 2" diameter — any material —
small or large quantities. Prompt service.

IMSANDE SCREW PRODUCTS CO.
3517 Cardiff Ave., Oakley, Cincinnati, Ohio

CENTERLESS GRINDING

SINCE 1925

CINCINNATI
ICE PICK & TONG MFG. CO.
118 BURROWS ST. • CINCINNATI, O.

GRIND THE
Eastern Centerless
Way

Our new plant with
increased facilities
assures

PROMPT SERVICE

Eastern Centerless Grinding Co.
Incorporated
470 Tolland St. East Hartford, Conn.

PRECISION GROUND

GEARS
THREADS

CAMS
SPLINES

Excellent facilities for grinding gears, cams, threads and splines
on a contract basis.

SEND BLUEPRINTS FOR ESTIMATE

HARTFORD SPECIAL MACHINERY COMPANY

Hartford, Conn.

CENTERLESS GRINDING

Straight, Cylindrical, Shoulder, Profile, and
Multiple Diameters . . . Ground Taper Pins
Screw Machine Products. Heat treated and
ground if necessary. Improved and expanded
facilities insure prompt and accurate service.

Send blueprints or samples for estimates.

PORTER MACHINE CO.
3139 Enyart Ave., Oakley, Cincinnati, Ohio

A COMPLETE

PRECISION GRINDING

SERVICE

CENTERLESS GRINDING
INTERNAL CYLINDRICAL
GRINDING
EXTERNAL CYLINDRICAL
GRINDING
BLANCHARD SURFACE
GRINDING
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Send Blueprint Sketch or Samples for Quotation



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MANUFACTURING CORP.
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MACHINE TOOL BUSINESS FOR SALE

including all drawings, patterns, fixtures, good will, orders on hand, etc. This machine has been on the market for some time, is something new in its field, highly successful, and is a good item for after the war production. Good reason for selling. Inquiries on your letter-head should be mailed to Box 14, Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio.

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UP TO 3" BAR OR CHUCK.

PRODUCTION MILLING ON DUPLICATE
MACHINE PARTS.
GAUGES, JIGS, FIXTURES AND SPECIAL
MACHINES.

BEAVER MACHINE & TOOL CO.
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Prompt Service Guaranteed

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Inquiries Solicited

Univex Die Cast & Engineering Co.
Phone VINewood 1-9008
6345 West Lafayette Detroit, Mich.

Plant Maintenance Superintendent

for Eastern plant engaged in metal manufacture. Must be able to take complete charge of all equipment, installations and repairs as well as building maintenance. Full knowledge of electrical equipment including such as operate on electronic principle. Must be competent to direct large force of maintenance workers. The company is one of the leading metal manufacturers and offers excellent after war opportunities. Apply by letter giving full particulars and salary desired. State age, height, weight and when available. Address G-75, P. O. Box 3495, Philadelphia, Pa.

BAKELITE SILENT GEAR SERVICE

ALL SIZE BLANKS IN STOCK.
Teeth Cut To Your Specifications.
Prompt Delivery. Write for quotation.

GREAVES MACHINE TOOL COMPANY
2009 Eastern Avenue Cincinnati, Ohio

Advertise Your Service

in the SERVICES DIRECTORY SECTION

WRITE FOR RATES

MODERN MACHINE SHOP
431 MAIN ST. CINCINNATI, OHIO

"Practical Design for Arc Welding" is the title of a new data service in loose-leaf form which is now being offered by The Hobart Brothers Co., Troy, Ohio. Replete with time-saving suggestions for economical design of change-overs or new products, this series of sheets has been prepared by and is based on actual experiences of Robert E. Kinkhead, a well-known independent welding consultant who has had many years of practical experience and field contact with welding in its various phases and applications.

The loose leaf format, to fit standard files or binders, is being used so that the service may be readily adapted to the individual user's preference. The sheets are said to offer suggestions that

are of such universal application that the matter of size and detailed specifications are left open, thus enabling such details in each case to be determined by the designer to meet the requirements of the job at hand.

The first section of this service is now being released to a selected list of firms and individual executives who can make the best possible use of the new ideas. By writing to The Hobart Brothers Co., Box EW86, Troy, Ohio, all manufacturers interested in this service will be automatically enrolled to receive future plate titles as they are issued. Name and title of the individual who can best make use of these suggestions for design should be given.

**A**

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by HAN FISHER

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UPSTATE IS PAYIN' 9 CENTS AN
HOUR MORE THAN WE'RE
GETTIN'! WHY DON'T WE
MOVE UP THERE AND GET
SOME OF THAT DOUGH!

SOUNDS
GOOD
TO ME

AW, YOU GUYS MAKE ME SICK! BY THE TIME YOU
GOT THERE, AN' FOUND A PLACE TO LIVE, AN'
CHANGED YOUR KIDS TO ANOTHER SCHOOL, AN'
PAID YOUR MOVIN' EXPENSES AN' EVERYTHIN'
ELSE YOU'D BE IN THE HOLE ABOUT A HUNDRED
BUCKS. BESIDES, I HEARD THAT EVERYTHIN'
COSTS MORE DOWN THERE...THAT'S THE ONLY
REASON THEY'RE PAYIN' 96 AN HOUR MORE.
LOOK, BUD, THE GOVERNMENT WANTS US
RIGHT HERE...OUR JOB IS TO GET THIS
STUFF OUT AN' WIN THE WAR AN' GET
OUR BOYS HOME AGAIN!



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It Is Later Than You Think!

The "Last Word" comes this month from the pen of an unknown poet whose sentiments, expressed in these lines, seem to us to be particularly timely.

When you're lying in a fox-hole with a rifle at your cheek,
Then there ain't no time for thinking of a forty-four-hour week,
For the tropic rains pour on you while your nose is in the mud
And your overtime is counted when they pay you off in blood.
You just grip your rifle tighter as you wade into the fight,
And there's no time off for gassing 'bout the date you had last night,
For you know it would be foolish, and you save your precious breath,
For the only date you're keeping is a rendezvous with death.

And you feel the fevered silence
As the sun begins to sink,
Time is short and growing shorter,
It is later than you think.

When you're home and working steady you have time to shoot the bull
For the boss ain't always looking and his hands are kinda' full,
You can grouse about your wages; you can sneak out for a smoke;
You can leave the drill press idle while you hear or tell a joke;
But the pay-off's coming later for the job you haven't done,
When the fighting isn't over and the battle isn't won.
For the forge that's lying idle forges chains you cannot see
'Til you find a stricken Nation in the bonds of slavery.

And eternity will damn you
As your soul begins to shrink,
Time is short and growing shorter,
It is later than you think.

Some are born to do the fighting, some must work and some must pray,
But there isn't one among us who can sit and rest today;
For the freedom that we cherish puts a levy on our soul,
And we may not shirk our duty 'til we reach that final goal.

For the time is growing shorter
As we near destruction's brink,
And your job needs lots of doing,
IT IS LATER THAN YOU THINK!

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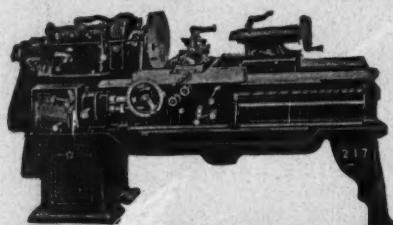
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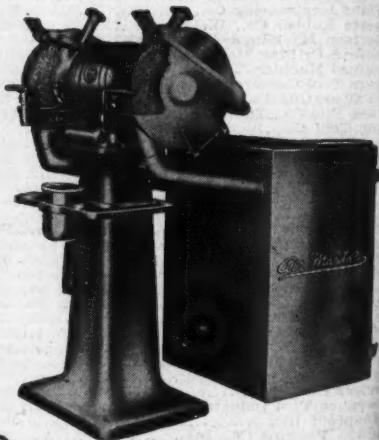
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MAYBE YOUR FOREMAN CAN'T SPELL EFFICIENCY

He doesn't have to know how to spell it. Experience has taught him that for high efficiency in the grinding and buffing department, the air must be clean—free from dirt and grit. A man can't do his best work while fighting dust-laden air. He slows up—and slows up production.

In the foreman's shop primer, "Efficiency" begins with an "A"—for Air Master. The Air Master traps dangerous dirt as it leaves the grinder. Easy to install. Easy to clean. A size for every grinder, or buffer. Write today for descriptive literature.



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The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO

3702-1

MADISON RD.



in their minded production men



See that kid in uniform? It's his first morning home. He's finished with his job of fighting a war. Now there is peace. But can it be peace if this kid — yours, perhaps — and millions more like him, face a "no help wanted" future? American business has the answer. It's sales. Sales make jobs. Production must promote sales . . . by making it better, faster, in greater quantity for less money, for more people. How about your productive "sales promotion" equipment? Your lathes, for instance? Will they turn to the tempo of *lowest cost post war production*? A "maybe" answer won't do. The boys coming back have a heritage coming due. It is largely up to "heir" minded production men to see that they get it . . . the opportunity to earn an honest living by honest work in support of the *real* American standard of life.

MEMO: *U. S. Department of Commerce predicts that if the war lasts through 1944, Americans will have accumulated savings amounting to \$100,000,000,000. Be prepared for mass marketing. From now on business must reckon with huge masses of buyers.*

Le BLOND

MACHINE TOOL CO., CINCINNATI, 8

time to retool
Turn to Le Blond
for Turning Equipment
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHE



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THE BETTER FASTENING METHOD

EVERY SINGLE HOLO-KROME SOCKET SCREW PROD
GUARANTEED TO GIVE UNFAILING PERFORMANCE

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Forged SOCKET SCREWS

THE HOLO-KROME SCREW CORP. HARTFORD 10, CONN. U.S.A.

MODERN Machine Shop

February, 1944

ft different blade
REINFORCED
"LENOX" BLADES
STINSON AIRCRAFT DIVISION

Hackmaster

An exceptional Hand Blade made of Molybdenum High Speed Steel that has the back of the Blade annealed so as to make it unbreakable, and the tooth edge hardened for durability. Has all the cutting qualities of the standard Molybdenum High Speed Blade.

May be used under all awkward sawing conditions, or by inexperienced men, with complete satisfaction and fast cutting speed.

Stocked By Distributors Everywhere.

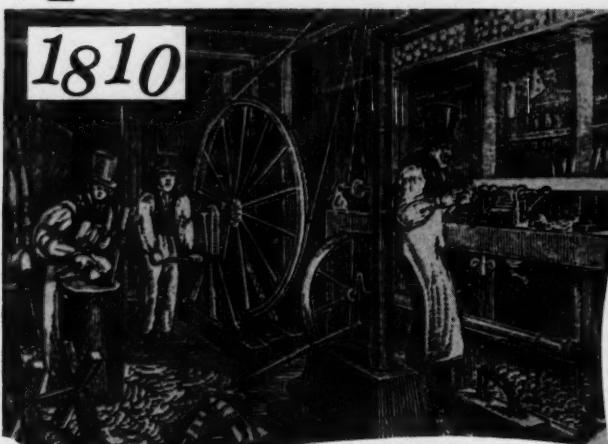
AMERICAN SAW & MFG. CO.

SPRINGFIELD, MASS.

"The Blade in the Plaid Box"

Just imagine / production then

1810



Bettmann Archive

... And Now!

ABOVE is an interior view of an American Machine Shop in the earlier part of the 19th century. Eli Whitney's Rifle Shop must be pictured as being equipped with similar machinery and tools. Note the motive power and work being done by hand. Compared by the standards of today, there just was no such thing as production. Perhaps the greatest single improvement over the old methods was

the advancement in the use of air and hydraulics . . . the application of air or hydraulic pressure for the operation of chucks, work holding and ejecting devices, assembling presses and many other labor saving devices. Let "LOGAN" Engineers make recommendations on modernizing your plant with the application of "LOGAN" Air and Hydraulic Equipment.

"LOGAN" MACHINE, INCORPORATED
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LOGANSPORT, INDIANA
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Pumps and Accessories

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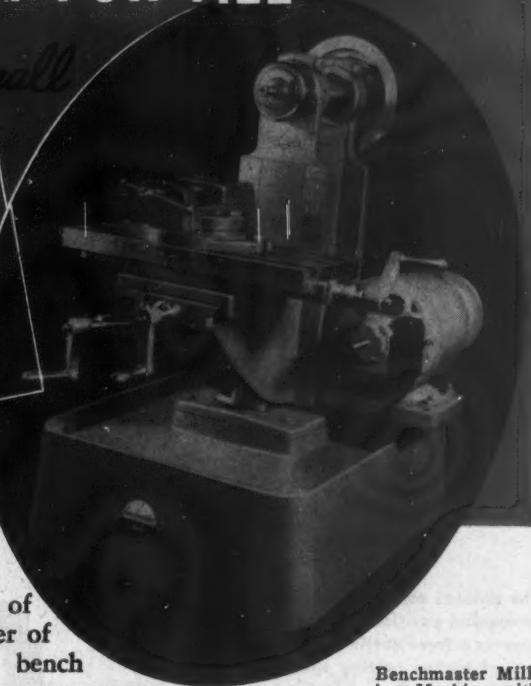
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February, 19

PRECISION FOR ALL-

Large or Small

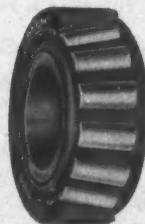


Precision isn't a matter of size; it's largely a matter of bearings. The smallest bench lathe, shaper or miller can operate with the accuracy of its big brothers of the tool room and production line if its spindle is mounted on Timken Tapered Roller Bearings.

Timken Bearings assure smoothness of operation; permanent spindle rigidity; freedom from erratic spindle action and chatter. They prevent spindle wear and provide full protection against radial, thrust and combined loads.

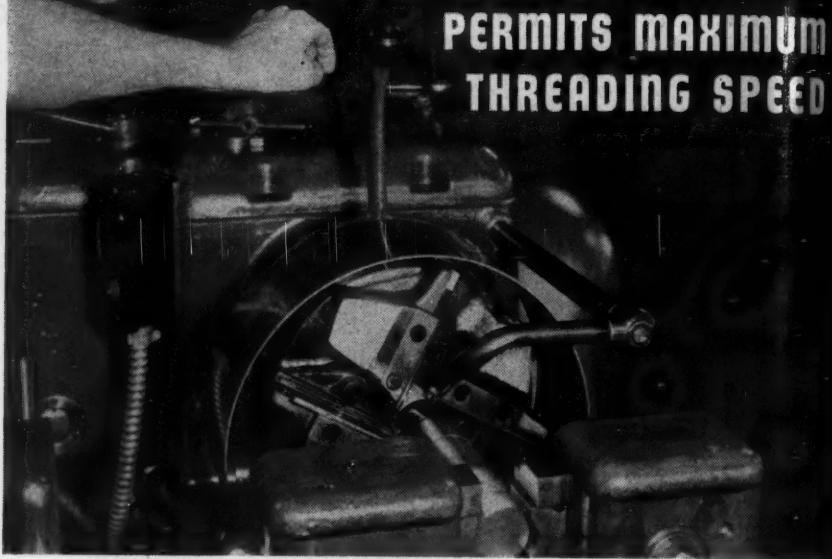
See that your machine spindles are equipped with Timken Bearings; that means precision —now and for years to come. The Timken Roller Bearing Company, Canton 6, Ohio.

Benchmaster Milling Machine with spindle mounted on Timken Bearings. Manufactured by Benchmaster Manufacturing Company, Los Angeles, Calif.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

FREE CUTTING ACTION OF LANDIS CHASERS PERMITS MAXIMUM THREADING SPEED



The natural cutting clearance obtained by the tangential position of the chaser with the work assures a freer cutting action which permits the use of higher cutting speeds.

Since the Landis Tangential chaser has only a theoretical line of contact with the work, friction is considerably lessened and even with the highest threading speeds the possibility of thread distortion is reduced to a minimum.

The Finest Thread Cutting Tool in Industry

LANDIS

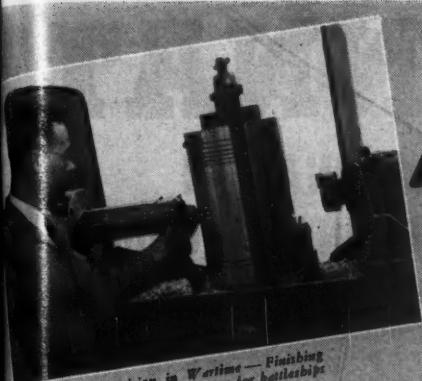
MACHINE COMPANY
WAYNESBORO, PA., U.S.A.

12 Features of the LANDIS TANGENTIAL CHASER

- 1-Permanent throat permits close to shoulder threading throughout life of chasers
- 2-Rake angle range covers all machineable materials
- 3-Free cutting condition permits maximum cutting speeds
- 4-Simple grinding operation renews entire cutting edge and leading feature
- 5-Line contact with work lessens friction and minimizes thread distortion
- 6-Leading feature insures thread of accurate lead
- 7-Lateral absorption of cutting strain reduces vibration and chaser breakage
- 8-Right and lefthand threading feature reduces chaser equipment
- 9-Standard chasers thread all diameters with proper chaser holders
- 10-Interchangeability of chasers lowers operating cost
- 11-Chaser length provides exceptionally long life and low tool cost
- 12-Permanent throat gives equal distribution of cut

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

RS
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Precision in Wartime — Finishing
diesel engine pistons for battleships

In 1944

LET'S WORK FOR VICTORY

Only reconversion planning NOW can avert the widespread unemployment otherwise inevitable in the period between cessation of war production and resumption of peacetime production. Not that we have won the war, we haven't, and a long, desperate battle lies ahead. Even so, every bit of postwar planning done now will help in far greater ratio, when V-Day comes, to provide for the stricken people of a ravaged world, in putting our demobilized soldiers and war workers back to work on useful jobs.

If your postwar plans include precision finishing, HEALD ENGINEERING is available, now. Long and varied experience in solving countless problems in precision boring and grinding in consumer and heavy industries, plus our undiminished present efforts in war production, can be immensely helpful. We'll be glad to work with you.

But Plan For Peace

THE HEALD MACHINE CO., Worcester, Mass.

Postwar precision operations will include Heald Bore-Matic like this for facing automotive flywheel.

In 1944

In 1944 the most tremendous shortage of goods this world has ever known must be satisfied — by you and your competitors. Planning now for postwar production will eliminate many bottlenecks later — and if problems involve precision Heald will gladly cooperate in their solution. Although our staff of 250 engineers are engaged on war problems, their experience in finishing peacetime products from automobiles to sewing machines is also available to help in your postwar planning.

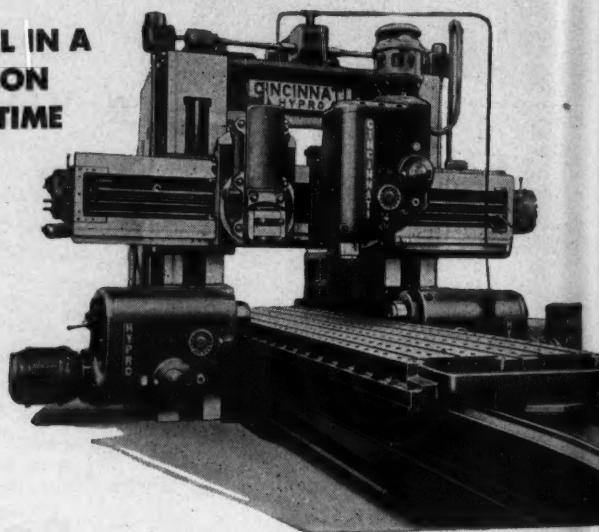


for More Precision Faster, bring your problem to Heald

CINCINNATI

HYPRO COMBINATION PLANING AND MILLING MACHINES

CUT METAL IN A
FRACTION
OF THE TIME



• The heaviest machine in the plant of a large machine tool manufacturer is this Cincinnati Hypro Combination Planer and Milling Machine. Because of the rigidity of the machine it is possible to use sintered carbide cutters of unusually large size. The vertical and horizontal cutters rough and finish grinder bed castings.

• There is also available without removing the casting from the machine, the planer head shown on the left above. This head is used for large, multiple tool planing, a feature which has unlimited possibilities.

WRITE FOR BULLETIN 105-MM.

The **CINCINNATI PLANER Co.**

CINCINNATI

OHIO, U.S.A.

PLANERS • PLANER MILLERS • VERTICAL BORING MILLS

If you
remove
the cover
of a

FARREL GEAR UNIT...

... YOU FIND that the gears are of the continuous tooth herringbone design—*The Gear with a Backbone*—precision generated by the famous Farrel-Sykes process. Among the advantages of these gears are:

1. Extra strength and high load-carrying capacity in small space. There is no center groove between the two helices, which means that the entire face width is put to work.

2. Smooth, quiet operation. The result of interlacing of the teeth, gradual engagement and inclined line of pressure.

3. Long, trouble-free service. Oblique lines of contact and evenly distributed pressure eliminate any tendency of teeth to wear unevenly, and maintain correct tooth action throughout the life of the gears.

Farrel Gear Units are available for a wide range of applications and service conditions. For further information, write for a copy of Catalog 438.



The darndest machine you ever saw...



Its job is to finish all of the bearing surfaces on a crankshaft at one fell swoop! The older method of performing this same operation is to hold the abrasive cloth in a "nutcracker," finishing only one surface at a time.

2 With the new machine, strips of successively finer grits of abrasive cloth, having serrated edges to permit the strips to follow the fillets of the bearings, are automatically inched past the revolving crankshaft from a feed roll of the cloth. And on many a job it's Aloxite Brand cloth by Carborundum that gives the ultimate smooth, satin finish.

3 Further improvements in techniques of grinding, finishing, sharpening and polishing, developed through the facilities of The Carborundum Company, will be helping to produce still more for less, now as well as in postwar period. Remember abrasive products are "Weapons for Production." Use them wisely. The Carborundum Co., Niagara Falls, N. Y.



Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company.



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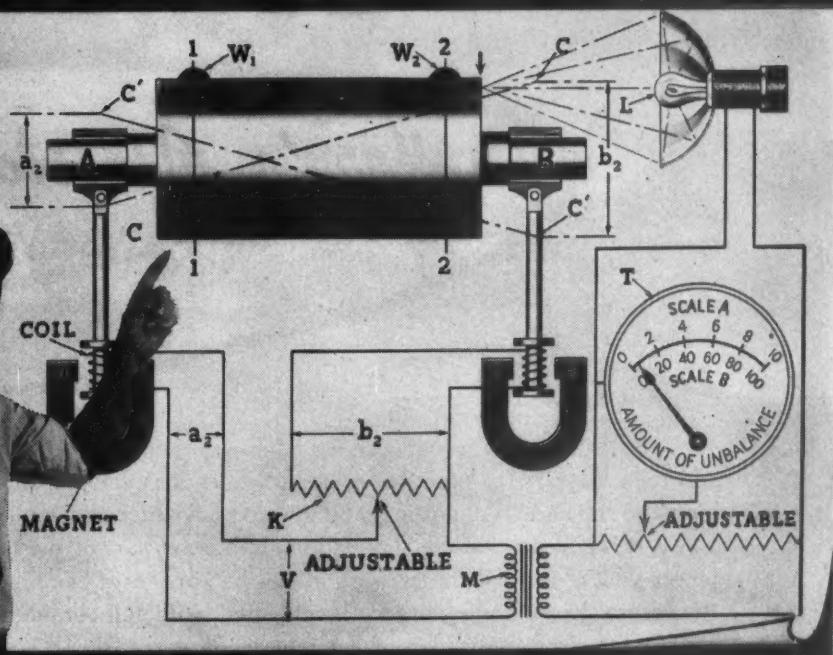
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Design for Living - Longer

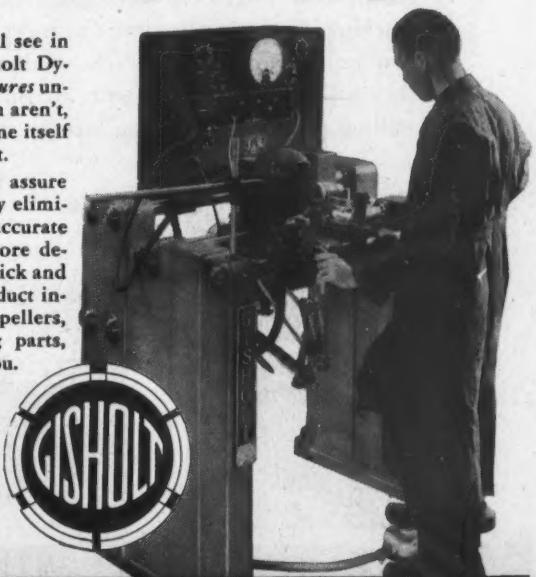
IF YOU'RE an electrical engineer, you'll see in this schematic diagram how the Gisholt Dynetric Balancing Machine *locates* and *measures* unbalanced forces by electrical means. If you aren't, don't let it bother you. Because the machine itself is so simplified that anyone can operate it.

The important thing is the way it can assure longer life in high speed rotating parts by eliminating vibration. It enables you to make accurate balance a *part of design* for smoother, more dependable operation. And it provides the quick and efficient means of insuring it. If your product involves the use of armatures, crankshafts, impellers, fans, pulleys, other high speed rotating parts, learn how Dynetric Balancing can help you.

GISHOLT MACHINE COMPANY

1219 East Washington Ave.
Madison 3, Wisconsin

LOOK AHEAD... KEEP AHEAD...
WITH GISHOLT IMPROVEMENTS

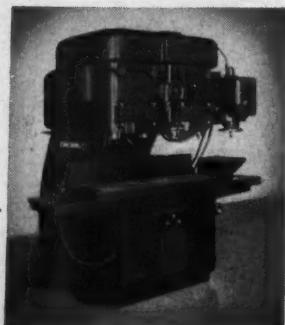


RETR LATHES • AUTOMATIC LATHES • BALANCING MACHINES

Here's Assistance

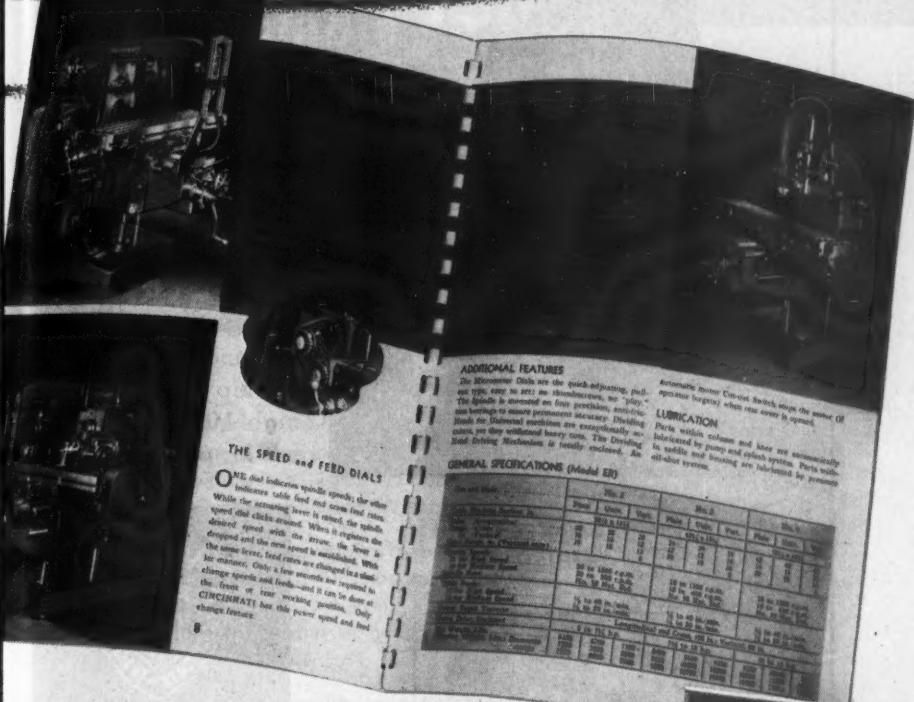
Behind every recognition for a job well done, the "E" awards and renewal stars for production, lies a tremendous amount of planning and thought. Without it, nothing would have been accomplished. Now, while production for war continues, a good part of the brain-power which planned the conversion can be applied to planning for the future. Every angle must be investigated, with full consideration to more efficient application of machinery.

Machine tools bearing the CINCINNATI trade mark, so prominent in tooling for victory, will again be applied to the production of automobiles, farm machinery, radio equipment and other consumer goods. Our engineers have long experience in offering the right machine, fixture, and cutters to meet specific requirements. Whether you are retooling for new war production or planning for the future, they will be glad to work with you on machining operations involving milling, grinding, broaching, lapping, die sinking and cutter sharpening.



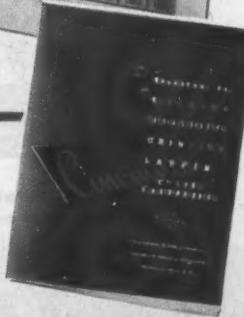
FOR THAT NEVER-ENDING JOB

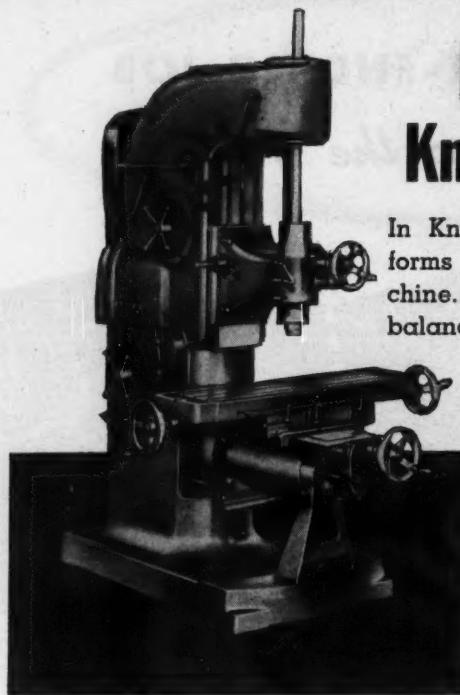
of Planning for the Future



opy of our new General Catalog, No. M-995-2, is
for the asking. Perhaps it will give you some
on machines for your future production lines.

Here are two of the newer CINCINNATI machines which are doing grand jobs of war production and will take a prominent place in peace-time production. Literature on request. *Left:* CINCINNATI 4-Spindle 360 Degree Automatic Profiler (catalog M-1215). *Right:* CINCINNATI 6" Plain Hydraulic Grinding Machine, Model ER (catalog G-592).



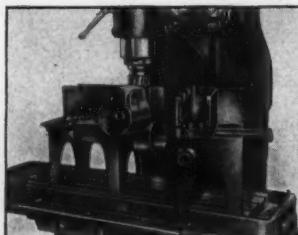


Rigidity in Knight Millers

In Knight Millers, the column forms the backbone of the machine. Upon this foundation the balance of the machine is assembled.

The high carbon steel spindle is accurately ground and mounted on precision, tapered roller bearings. Only the highest standards of workmanship are built into Knight Millers. They are built for punishment.

**Write for illustrated
catalog.**



**Operator has clear view and
free access for checking when
machining this odd-shaped
casting.**



FELLOWS PRECISION FINISHING now available for FINE PITCH SMALL GEARS

Manufacturing executives and production men will welcome the advent of this running mate for the Fellows Fine Pitch Gear Shaper—a new No. 4 Fine Pitch Gear Shaving Machine.

Rotary Gear finishing has so firmly established its place in precision manufacture as to make this new tool "a natural" for every shop which is turning out external spur or helical gears of 4 inches diameter or less.

It embodies means for maintaining super-rigid alignment of work and the finishing tool on which indefinite duplication of highest accuracy depends.

Complete details are available. Write The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit, Mich., or 640 West Town Office Bldg., Chicago, Ill.



THE FELLOWS GEAR SHAPER COMPANY

8 River St., Springfield, Vermont—640 West Town Office Building, Chicago, Illinois—616 Fisher Building, Detroit, Mich.

Those Landis



Long ago Landis Universals took their place in the production line. Here their versatility, plus their productiveness, has broadened their use to a surprising degree.

The ease with which a variety of internal fixtures may be applied has readily adapted these machines to unusual internal grinding operations. Special work heads and holding fixtures have enabled them to handle odd shaped parts. And finally, the sturdy swiveling headstock has made it a simple matter for them to perform a variety of face grinding operations.

These typical set-ups are illustrated to the right:

J-190. Grinding the bore in the end of an airplane crank-shaft on an 18" x 72" Landis Universal. One end of the work is held in a pot chuck while the other end is supported by a center rest. There are three separate grinding operations—the taper portion of the bore, the straight portion of the bore and the radiused counterbores.

J-193. Radius grinding an airplane engine oil seal ring on a Landis 14" x 36" Universal. The work is placed in a holding fixture which is clamped in a finger type chuck. The grinding wheel is formed to a suitable radius by a radial wheel dresser and the work head is oscillated by hand during grinding.

J-192. A raised Landis Universal (25" x 72") equipped with a 36" diameter face plate. The standard headstock is swiveled 90° so that this face plate may be swung in the water channel and a variety of parts are attached thereto for face grinding.

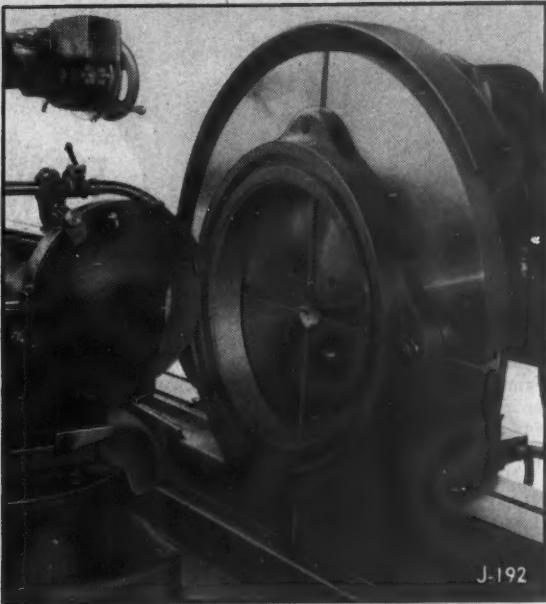
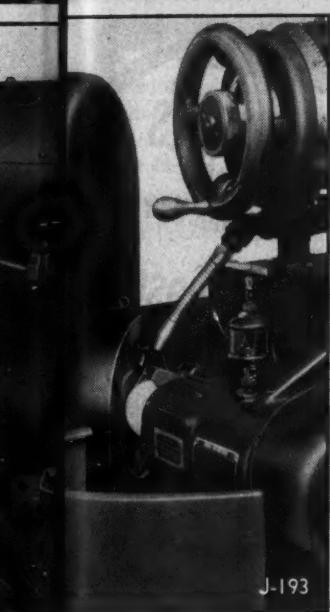
Landis Type C Hydraulic Universals are available in sizes ranging from 10" x 24" to 18" x 72". As indicated by the examples just given, extra equipment and raised swings further increase the variety of work that may be handled.

Never will the versatility of this equipment stand its users in better stead than when coming months bring the necessity to convert from the manufacture of one product to another.

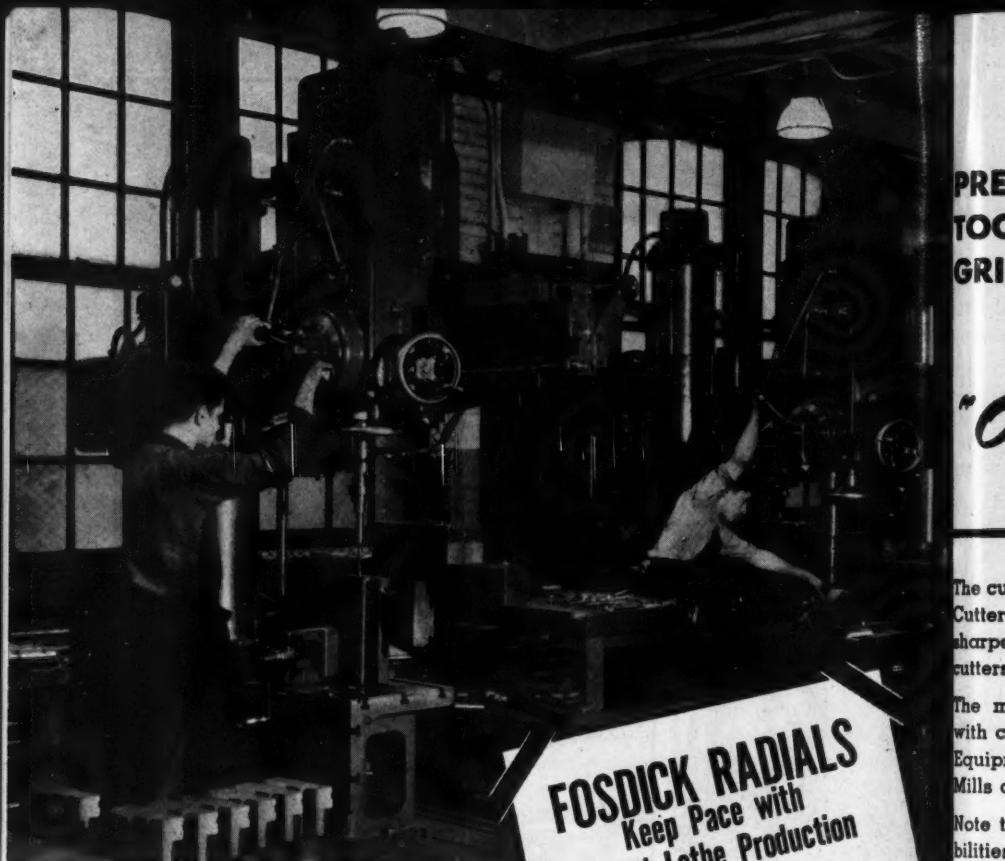
424



LANDIS TOOL CO. WAYNESBORO - PENNA.



Unusual Performance as Usual



● The Fosdick Radial in the foreground is responsible for drilling, boring, reaming and inside facing 12 holes in a cast iron carriage unit for a W. & S. "Ram Type" Turret Lathe. These holes range from .261" to 1 $\frac{1}{8}$ " diameter. A special holding fixture is used for most of the operations but this has been removed to counterbore a jib screw hole.

The other Radial is drilling oil holes in a cast iron saddle for a W. & S. Slide Tool. Two fixtures are used to drill, counterbore and tap eight holes in this piece.

Here again is definitely demonstrated Fosdick versatility in meeting varied requirements — speedily, accurately and at low cost.

FOSDICK RADIALS
Keep Pace with
Turret Lathe Production
for
Warner & Swasey

Your work may not be identically the same, the material may also be different—but if the job can be done on a Radial it can be done on a Fosdick.

Write for Bulletin MSR for details of construction and application. Built in six sizes from 3 foot to 8 foot inclusive.

FOSDICK

MACHINE TOOL COMPANY
CINCINNATI . . . OHIO

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PRECISION TOOL AND CUTTER GRINDING

The "Oliver Way"

The cut illustrates the Oliver Ace Tool and Cutter Grinder as regularly supplied for sharpening the General Run of Milling cutters.

The machine as illustrated is equipped with centers for grinding Hobs, Reamers, Taper Reamers, Staggered tooth cutters, etc. Equipment includes an Adjustable Timken Bearing Head with Taper for Mounting End Mills and similar cutters with shanks.

Note the Simplicity of Setup, the ease with which angles are obtained and the possibilities for Rapid Production of individual cutters or quantities of similar cutters.

This is the machine you have heard about; the machine that cutter Manufacturers are using in quantity to Break the Bottle Neck in the production of Milling cutters.

SEND FOR LITERATURE TODAY.

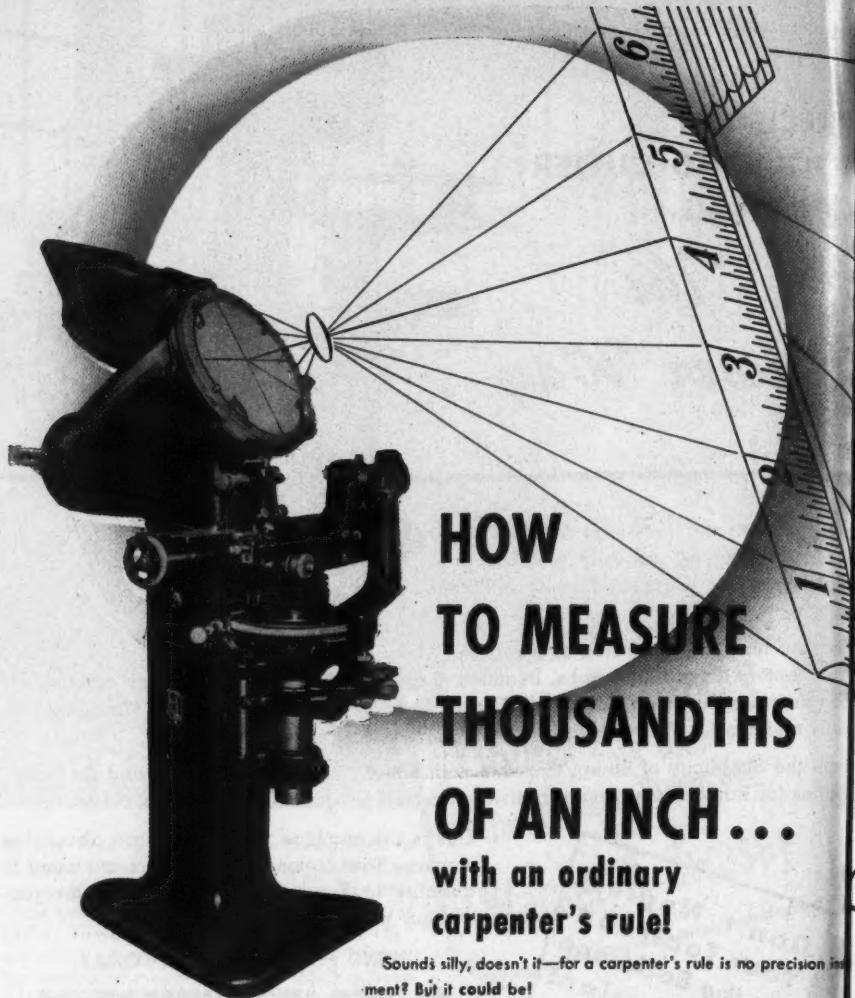
OLIVER INSTRUMENT CO.

1410 E. MAUMEE ST.

ADRIAN, MICHIGAN

Oliver

AUTOMATIC DRILL GRINDERS
AND CUTTER GRINDERS
POINT THINNERS
TOOL GRINDERS — JACK HAMMER
GRINDERS — DIAMOND GRINDERS



HOW TO MEASURE THOUSANDTHS OF AN INCH... with an ordinary carpenter's rule!

Sounds silly, doesn't it—for a carpenter's rule is no precision instrument? But it could be!

With a Jones & Lamson Optical Comparator, the shadow of a small metal part measuring .001" projected at 62½" magnification would appear on the screen 1/16" thick and could be measured on an ordinary carpenter's rule.

Of course we do not suggest the use of a carpenter's rule in your inspection department. But you can use a technique as simple as this.

We'll be glad to help you. Send samples and blueprints to Jones & Lamson Machine Company, Springfield, Vermont.

For rapid, economical inspection... **BEYOND A SHADOW OF A DOUBT**

Manufacturers of Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading De-

**JONES &
LAMSON**
MACHINE COMPANY
SPRINGFIELD, VT. U.S.A.

OPTICAL
COMPARATORS



PROFIT-PRODUCING
MACHINE TOOLS

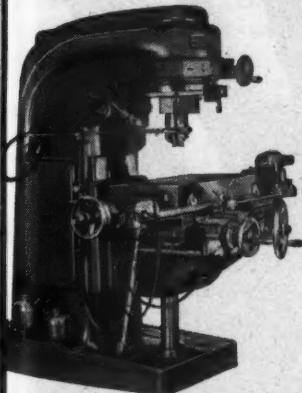
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ROTARY HEAD MILLER... PLUS CHERRYING ATTACHMENT . . . SIMPLIFIES THIS "TRICKY" MILLING OPERATION

The Milwaukee Rotary Head Miller equipped with a cherrying attachment made "short work" of the "tricky" milling required on this injection mold. It took just two hours to complete the job — far less time than by any other method known.

The cherrying attachment is an auxiliary rotary head, mounted at 90° to the head of the miller. It is used to mill circles and angles in a vertical plane. When used with rotary head motion, spherical and conical cavities can be accurately and rapidly milled — in almost all cases difficult operations become a comparatively simple task.



KEARNEY & TRECKER'S ROTARY HEAD MILLER

*The Most Versatile Machine Ever Designed
for Mold and Die Work*

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements — possible only with this machine — trans-

mits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies.

**Kearney & Trecker
Products**

C O R P O R A T I O N

Milwaukee, Wisconsin

Subsidiary of Kearney & Trecker Corporation

Rotary Head
Milling Machine

Automatic
Jig Barers

Center Scope

Milwaukee
Face Mill Grinder
Milwaukee
Midgetmill
Milwaukee
Speedmill

An old Twenty-Five Cent piecari



YOU CAN TURN IT BETTER

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carries a message for American Manufacturers



IT IS PATRIOTIC TO PLAN NOW FOR THE POSTWAR ERA

Warner & Swasey offers you practical help on postwar planning. We have a corps of engineers who are skilled in *all* machine operations involved in production of precision parts made of metal. They are helping many war plants improve methods and machines for greater production. They will continue to do so, but their services are also available to management interested in planning *now* for the future. Write Warner & Swasey, Cleveland 3, Ohio.



PERHAPS you have a 1909 quarter in your pocket right now. Look at it. In one claw the American eagle holds a bundle of arrows, in the other, an olive branch--ready for war--ready for peace!

Our nation didn't follow this advice to the letter. We were not ready for war. But we made up for lost time. America's might will prevent the world being ruled by Japs and Nazis.

We must not make another mistake and be unprepared for peace. What we do after this war to help a stricken world will be as important as our leadership and industry during this war.

If private industry anticipates the vast postwar demands which will fall upon American industry, and plans for it now, there will be work and jobs for millions of returned soldiers and ex-war workers.

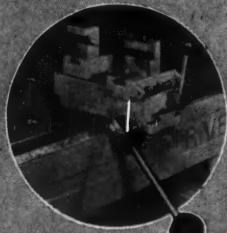
In a great reconversion program, American industry will need manpower—womanpower—and skilled management. It will need new machines, new tools, and new methods.

A recent survey indicated that major industry groups plan to spend over 2½ billion dollars for reconversion and modernization. Of this sum 47.7% is allocated for new equipment, 26.4% to replace old equipment, 25.9% to repair old equipment. A manufacturer who handicaps his workers on production lines with outmoded, inefficient equipment and machines will be left far behind in fast-moving postwar competition.

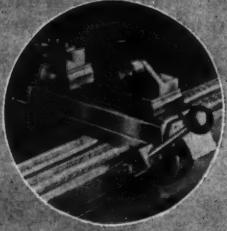
RIVETT

FOR BAR OR INDIVIDUALLY CHUCKED WORK REQUIRING UP TO EIGHT SUCCESSIVE OPERATIONS

**Straight and Taper Turning
Slides**



**Straight Turning Slide and
Fixed Block**



**Cutting-Off and Forming
Blocks**

SPECIFICATIONS

Swing over bed, dia.	9"
Distance between spindle mouth and face of turret	14 $\frac{1}{2}$ "
With draw-in collet	14 $\frac{1}{2}$ "
With push-out collet	13 $\frac{1}{2}$ "
Collet capacity:	
Draw-in type, max. dia.	1"
Push-out type, max. dia.	1"
Step chuck capacity, max. dia.	8"
Low chuck capacity, max. dia.	8"
Spindle capacity, max. dia.	1 $\frac{1}{2}$ "
Travel of turret slide, max.	4 $\frac{1}{2}$ "
Number of tool holes in turret	6
Dia. and depth of tool holes	$\frac{3}{8}$ " x 1"
Swing over double tool slide	4 $\frac{1}{2}$ "
Cross travel of double tool slide	.3"
Travel of straight turning slide	.2 $\frac{1}{4}$ "
Travel of taper turning slide	.2 $\frac{1}{4}$ "
Spindle speeds, eight forward and reverse:	
Low range	150 to 2500 r.p.m.
High range	225 to 3750 r.p.m.
Weight of hand screw machine, mounting and drive, net	300 lbs.

The Rivett No. 915 Hand Screw Machine incorporates precision, balanced design and operating features to make it an efficient producer on small duplicate parts. Work requiring up to eight successive operations can be finish-machined at one chucking. Bar stock passed through spindle may be held in push-out collet, while work individually chucking may be held in draw-in collet, step chuck or jaw chuck. In combination with six turret operations, double tool slide may be set up for straight or taper turning, forming or cutting-off.

Other combinations are available using chasing bar for internal or external threading, or compound slide rest with turret tool post. Steel cabinet mounting has rimmed top and sump for cutting oil. Bench mounting is optional.



RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

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"American" GRINDING WHEELS



for a Fine Finish



Another enemy ship goes down! PT Boats rush in to kill, strike their blow and flee. Speed in their attack, speed in their building are watch words. "American" Grinding Wheels are putting speed into PT production sharpening tools, grinding armor plate, gun coatings, struts and rudders, assuring precision fits and fine finish.

Wherever production is urgent "American" Grinding Wheels maintain their long established reputation for high quality and efficiency. Let us know your grinding requirements.

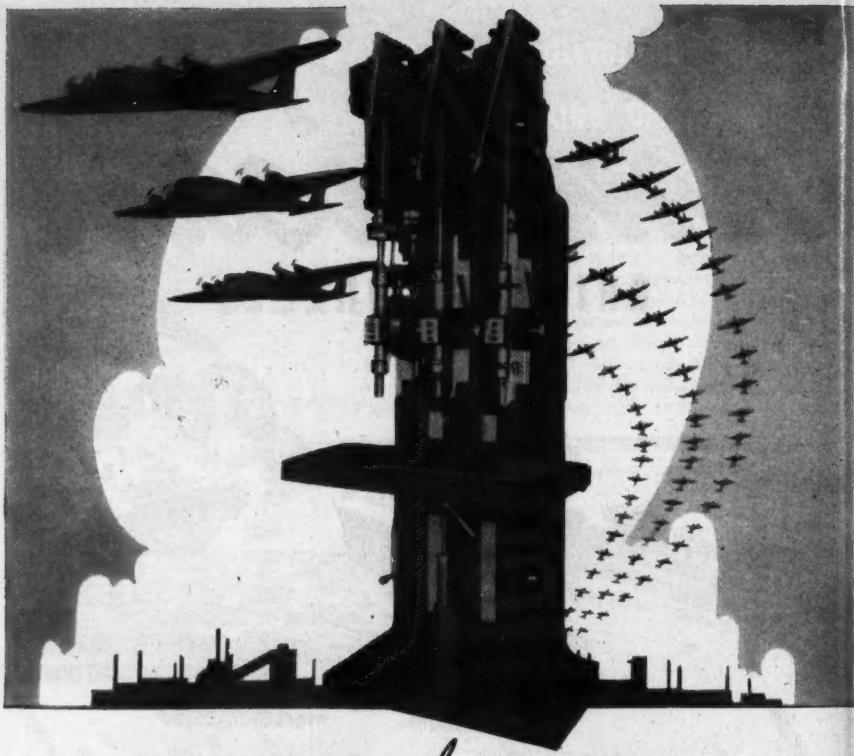


AMERICAN EMERY WHEEL WORKS

ESTABLISHED 1898

PROVIDENCE

RHODE ISLAND



ENROUTE to VICTORY

... Right—that's where we are heading; that's why it's important to make sure we leave no stone unturned to speed that journey. Our Avey MA-6 will maintain your high production levels. Built in No. 2 (capacity in cast iron, $\frac{7}{8}$ ") and No. 3 (capacity in cast iron, $1\frac{1}{8}$ ") sizes. One to six spindle units, either size. Six speed machine, two speed motor with three mechanical changes through gearing. Speed range is eight to one. Push button control. The above photograph shows the MA-6 equipped with three spindles, the Aveymatic Feed, Hand Feed, Tapper.

Famous for their versatility, this is a Standard type Avey Drilling Machine.



THE AVEY DRILLING
MACHINE CO.
Cincinnati, Ohio, U. S. A.



MODEL "LR" *Lo-swing*

Illustration at right shows tooling of a Model "LR" equipped for turning an Automobile Transmission Shaft. Equipment furnished consists of one three-slide Front Carriage; two Back Attachments, one carrying tools, the other a two-roll steady rest; one Top Slide; one 45° Undercutting Attachment.

The automatic cycle is as follows: First, the tools on the center slide of the Front Carriage spot the shaft for a Steady Rest bearing; Second, Steady Rest on Back Attachment moves in automatically to support work; Third, all tools start cutting simultaneously, those on Front Carriage turning all diameters, tools on Top Slide face and groove, tools on Back Attachment chamfer and groove while the Undercutting Attachment tool undercuts the head end at a 45° angle. The operation is entirely automatic. Operator merely loads and unloads and pushes starting lever.



UNLIMITED TOOLING POSSIBILITIES ARE AVAILABLE WITH THE LATEST TYPES OF AUTOMATIC *Lo-swing* LATHES



Lo-swing IMP

At left is a close-up illustration of an Imp Lathe equipped for turning, facing and rough and finish grooving aluminum pistons on a production basis.

The work is held and driven by an air-operated Wrist Pin Type Driver. The three tools mounted on the front carriage turn the skirt, ring groove lands, and round the end of the piston, while simultaneously the tools on the top slide face the end and rough turn the grooves. Immediately these tools have ceased cutting, the finish grooving tools on the rear slide finish the grooves to close tolerances.

The cycle is automatic . . . the operator simply loads and unloads the pistons and pushes the starting lever.

SENECA FALLS MACHINE CO.
SENECA FALLS, NEW YORK

LATHE NEWS from SENECA FALLS

WHERE ACCURATE BOLT TENSION IS REQUIRED

Snap-on TORQOMETERS

... MAKE PRECISION TENSIONING EASY AS READING A WATCH

Even veteran mechanics cannot be expected to guess correct bolt and stud tension... or estimate even close to uniform accuracy. But with a Snap-on Torqometer the most inexperienced worker can hit the specified pressure *every time*... right to the correct inch-pound or foot-pound... right to the swiftly and confidently! He sees the pressure as the nut is turned... easily as reading a watch!

On fine assembly and maintenance operations, Snap-on Torqometers insure precision, eliminate the danger of mechanical distortion. As easy to use as an ordinary wrench. Available in a full range of capacities, from 150 in. lbs. to 2,000 ft. lbs. Write for full information.



SNAP-ON TOOLS CORPORATION, 8032-B 28th Ave., Kenosha, Wisconsin

PROSSER

Carbide Grinders



MODEL 22

These modern, streamlined grinders are unequalled for rough grinding and fine finishing of carbides, tool steel, high-speed steel, and other high-production tools.

The grinders can be furnished in either bench or floor types, in several sizes, for wet or dry grinding. Attachments for chip breaker and drill grinding can be supplied.

SALIENT FEATURES OF PROSSER GRINDERS

- Quick-acting indexing tables.
- Adequate wet-grinding equipment.
- High-grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- Moderately priced.

*Prompt Deliveries
Write for Details*

Thomas Prosser & Son

120 WALL STREET

NEW YORK 5

"FIT FOR DUTY"



Only first-class cutting tools can turn work out fast enough—and accurately enough—to be rated as "fit for duty" on today's vital production line!

MORSE

THERE IS A
DIFFERENCE

**TWIST DRILL AND
MACHINE COMPANY**
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - CHICAGO STORE: 370 WEST RANDOLPH ST.

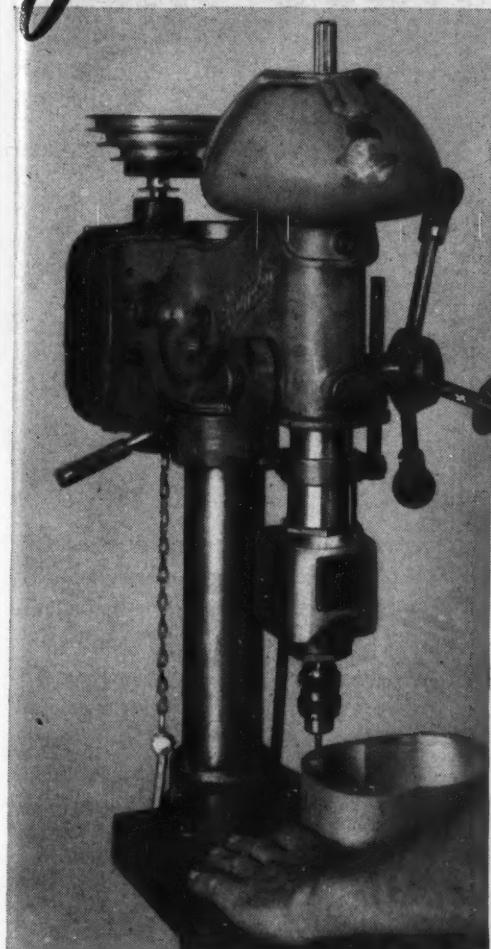
Jarvis

HIGH SPEED TAPPERS

Jarvis Tapping Attachments are built for high speed production, and long dependable service.

Famous for long tap life and extreme accuracy.

Send for Catalog MFTI



Built-in Type
JARVIS
TAPPING
ATTACHMENT

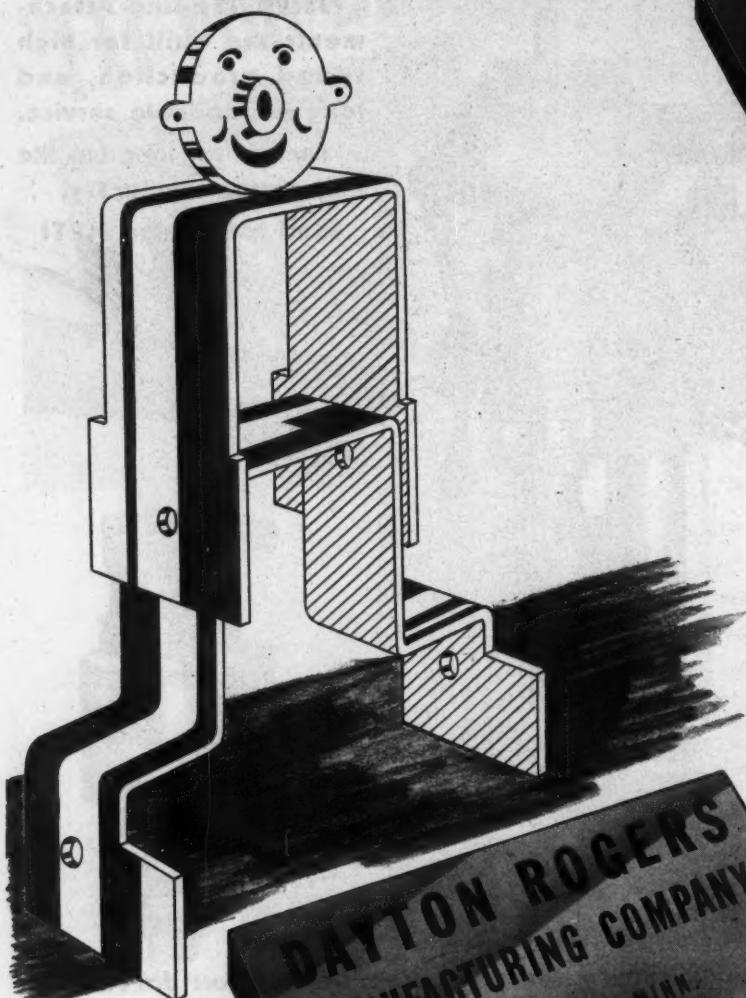
For Accuracy and Precision Depend on *Jarvis*

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

AND
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We have this



Thinking about STAMPINGS

- New developments in modern design frequently call for conversions that substitute heavy forgings and castings by using stampings. Machining bottlenecks are prevented through the proper use of forming presses and quantity production is expedited by eliminating many machine operations.

Dayton Rogers Manufacturing Co. is the pioneer in the development of methods for producing precision metal stampings in small quantities.

As specialists in the metal stamping field, the Dayton Rogers Organization offers you the benefits of its vast knowledge of design and production in the metal stamping field.

Dayton Rogers can furnish you with stampings of any shape, according to your special requirements. Blanking — piercing and forming can be furnished from any material at lowest possible die cost.

Send your blueprints or samples for quotations on any quantity of stampings required and remember that Dayton Rogers service includes —

"Stampings in Small Lots — At Small Cost"

Such Leadership must be deserved



Covel No. 12 Cutter
and Tool Grinder.
Ask for Bulletin
MM-24-12.

Covel No. 22 Cutter
and Tool Grinder.
Ask for Bulletin
MM-24-22.

Covel Yankee Twist
Drill Grinder.
Ask for Bulletin
MM-24-Y.

Broken Tools in your shop can be as damaging to the war effort as broken weapons on the battle field. For reconditioning worn tools and converting those broken ones for new and different uses, Covel offers you these machines —No. 12 and No. 22 Cutter and Tool Grinders, Covel Yankee Twist Drill Grinder—all three tested and proven under the rigors of war-time production.

COVEL INDUSTRIAL GRINDERS
COVEL MFG CO. BENTON HARBOR, MICHIGAN U.S.A.

from the desk of J. W. KING
PURCHASING AGENT

12:30—Ed: when you get back,
look these over—I think Armour
has the answer to our abrasive problem

JWK

ARMOUR'S ELECTROCOATED
ALUNDUM CLOTH
comes in 50-yard
economy rolls, to
end lost time be-
tween stockroom
and job.



ARMOUR'S FIBRE
COMBINATION
SANDING DISCS
help speed up die
casting seam re-
moval, beveling
and finishing.



ARMOUR'S ALUNDUM
CLOTH SHEETS.

Comes in 9 x 11-
inch sheets, for
precision hand fin-
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faces.



ARMOUR'S ALUNDUM CLOTH
SPIRAL WOUND BANDS
available in a wide
range of sizes and
grits for any size
clean-up job.



Whatever your abrasive problem,
chances are there's an Armour Abrasive
that answers it right to a "T."

For the Armour Sandpaper Works
are specialists in abrasives to meet
today's industrial needs... large or small.

From the most minute clean-up
operation to the biggest finishing job,

there's an Armour Abrasive designed
to do the job cleaner, faster, better.

The four Armour Abrasives shown
here are just a sample. We'd like to
show you the rest of the Armour
Abrasive line, with special reference to
helping you speed up today's produc-
tion. Call us in. No obligation.

ARMOUR SANDPAPER WORKS

Division of Armour and Company

1355 WEST 31ST STREET • CHICAGO, ILLINOIS

Union

HIGH PRODUCTION TOOLS

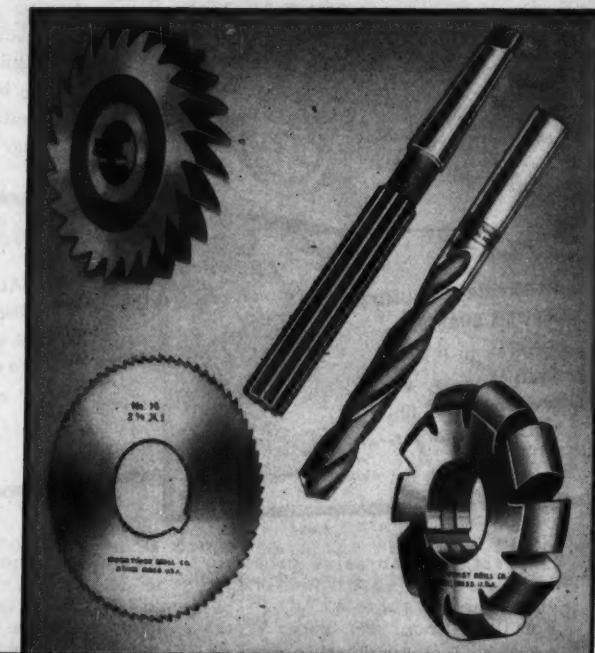
known the world over for perfection in machining on tough and unusual jobs.

Made of carefully selected steels and manufactured to most exacting standards to meet the grueling service demanded of tools today.

Union Tools are those you buy again and again.

TWIST DRILLS
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END MILLS
SCREW PLATES

● Meet today's urgent production requirements with Union Tools for speed—accuracy and tool economy. These rugged tools are

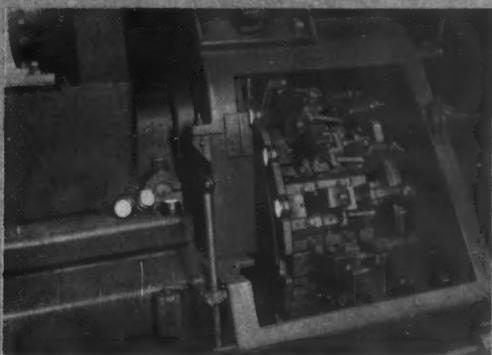


UNION TWIST DRILL COMPANY
ATHOL MASSACHUSETTS

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SAN FRANCISCO • 121 SECOND ST.
LOS ANGELES • 524 E. FOURTH ST.
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Grind your small flat surfaces
semi-automatically - HERE'S HOW!



FOR a great many small single-surface operations — like the shell parts seen above, for example — a Gardner No. 122-20" Semi-automatic Grinder is the ideal solution.

Carrying either a rotary-type work carrier, as shown here, or a revolving drum upon which fixtures are mounted, this machine turns out excellent production, and close accuracies.

These shell parts are steel, and are loaded by hand into automatically-clamping work-stations, unloading by gravity. **PRODUCTION: 20 to 25 pieces PER MINUTE**, holding the ground face within .001" for parallelism, and .005" for uniformity.

Check the possibilities of this type of **GARDNER GRINDER** —
WRITE FOR FULL DETAILS!

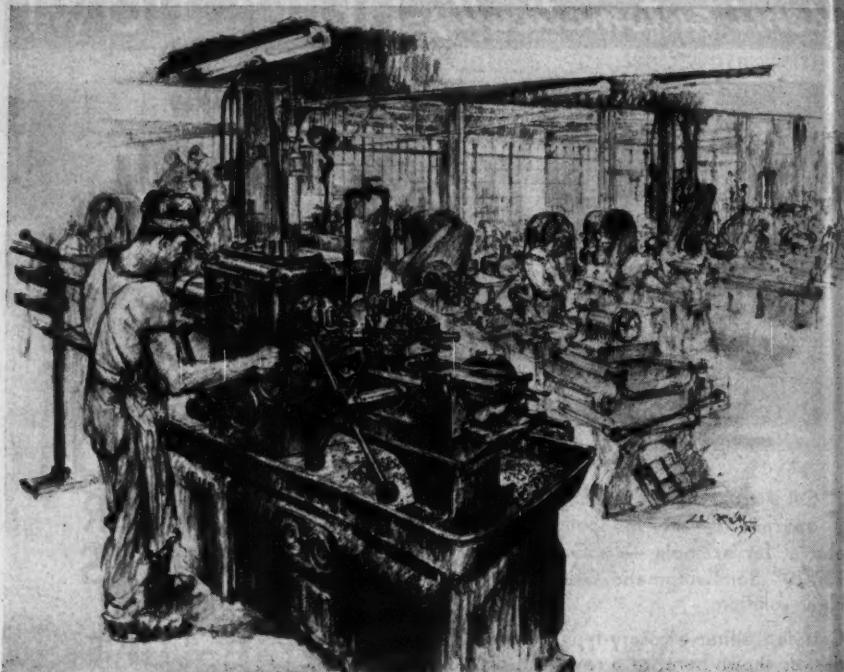
Use
**GARDNER
GRINDERS**
and
**WIRE-LOKT
ABRASIVES**
on your flat
surfacing operations!



GARDNER MACHINE COMPANY

428 East Gardner Street • • • Beloit, Wisconsin, U.S.A.

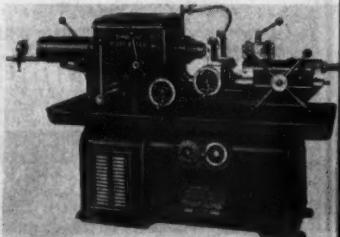
For War or Peace...A DEPENDABLE TURRET LATHE



Simmons No. 2 Turret Lathe, Drawn by Lili Roth

"Enthusiastic" is the word that best fits the reception given to the Simmons No. 2 Turret Lathe—both in volume of sales and satisfaction—since it was first placed on the market several years ago. Here's the reason: Simmons set out to manufacture a precision turret lathe *low in cost, sturdy and simple to operate*. Many "gadgets" and devices have been eliminated that might be required only on rare operations, complicate the instruction of new operators, and require unnecessary service attention. Why not investigate for yourself the merits of this unusual machine tool. It has $1\frac{1}{4}$ bar capacity, 14" swing, Micro-Speed Drive with a range of 1,000 spindle speeds, Timken Bearings, spindle brake and clutch. Ask for full details today. Simmons Machine Tool Corporation, 1745 North Broadway, Albany 1, New York.

Simmons-Built
MACHINE TOOLS



ABRASIVE 3-B SURFACE GRINDER



TODAY this highly accurate and dependable surface grinding machine is serving the production needs in many war plants.

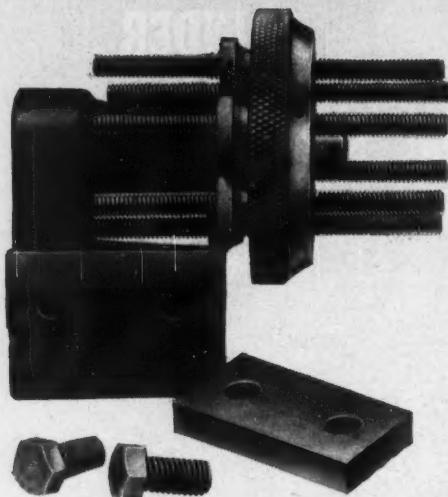
TOMORROW the accuracy, reliability and production capacity of the 3B grinder will be important factors in peace time competition.

ABRASIVE MACHINE TOOL CO., East Providence, R. I.
Dealers in Principal Cities

ABRASIVE

ACCURACY BOOSTS PRODUCTION

SPEED PRODUCTION WITH MULTIPLE LATHE STOPS



AMERICAN MODEL CS-1

MULTIPLE CARRIAGE STOP

- Sets 6 Stops for Duplicate Operations
- Accurately Gauges Length of Cuts
- Prevents Errors and Rejections
- Any One of 6 Stops Available
- Stops are Numbered and Indexed

MODEL CS-1 FITS ATLAS,
LOGAN, SOUTH BEND AND
SIMILAR LATHES.

\$16.75

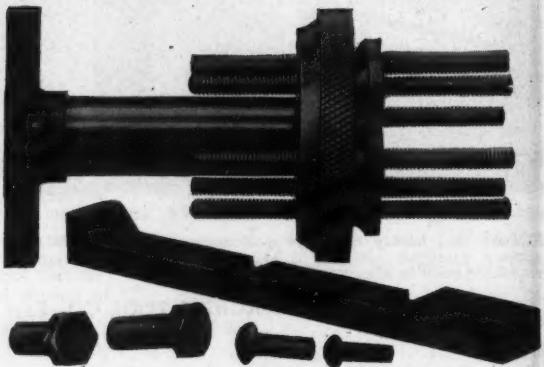
COMPLETE

AMERICAN MODEL DS-1

MULTIPLE CROSS SLIDE STOP

- Sets 6 Diameter Stops for Repeat Operations
- Prevents Spoiled Work
- Increases Production
- Makes It Unnecessary to Work by Dial Graduations

MODEL DS-1 FITS ATLAS,
LOGAN, SOUTH BEND AND
SIMILAR LATHES.



\$17.85
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All necessary parts are supplied with each Multiple Cross Slide Stop. Immediate shipment from stock. Rush order and priority today.

SCHULTZ & ANDERSON CO.

110 EDISON PLACE, NEWARK 5, N. J.

Tapping is easy

ON THE
Ettco-Emrick
FOOT-OPERATED
TAPPING MACHINE

It's no trick at all for girls to do fast, accurate tapping on this machine—and keep it up all day with very little fatigue. Here's why. (1) The operator has only to feed the work and step on the pedal; (2) The skill ordinarily needed is supplied by the Ettco-Emrick Tapping Head; (3) Both hands are free for work handling; (4) The whole mechanism is so sensitively counter balanced, the pedal works as easy as the accelerator on a car. Yes, inexperienced operators—girls or men—can give you a steady production of 2400 accurately tapped holes per hour with the standard 2-spindle head, and up to 12,000 per hour with available Ettco-Emrick Multiple Spindle Heads.

BULLETIN No. 4 will give you full details of this "almost human" machine. Copy mailed to you on request.



Photo courtesy of
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ETTCO TOOL CO.

598 Johnson Ave., Brooklyn 6, N. Y.
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25 YEARS SPECIALIZATION IN DRILLING AND TAPPING EQUIPMENT

What is

DIE-LESS DUPLICATING?

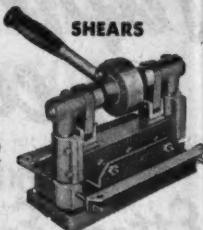
Here is a simple 3-STAGE explanation:

"DIE-LESS DUPLICATING" might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines — Shears, Brakes, Benders — especially when used as a continuous, integrated production process.



← 1st Stage

Cutting flat material to size and shape for part to be duplicated. The DI-ACRO Shear rapidly resizes and squares material, also makes slits, strips, notches, angle cuts, etc. 3 sizes,—shearing widths 6", 9", 12".



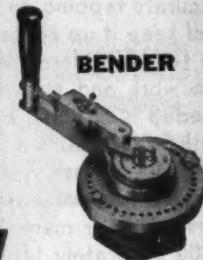
← 2nd Stage

Forming angles, channels or "Vees" from sheared flat material. The DI-ACRO Brake forms any angle from 0° to a maximum of 110°. 3 sizes,—folding widths, 6", 12", 18".



← 3rd Stage

Bending sized and formed material to simple, compound or reverse curves of desired radii. The DI-ACRO Bender handles angle, channel, moulding, rod, tubing, wire (round, square, flat), strip stock and other ductile materials in a remarkably wide range



DO YOU HAVE DUPLICATE PARTS TO FORM? ...

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided — deliveries speeded up.

of accurate contour forming. 3 sizes,—radius capacity 2", 6", 9", handling up to $\frac{1}{2}$ " cold rolled steel bar.

Send for Catalog—"DIE-LESS DUPLICATING"

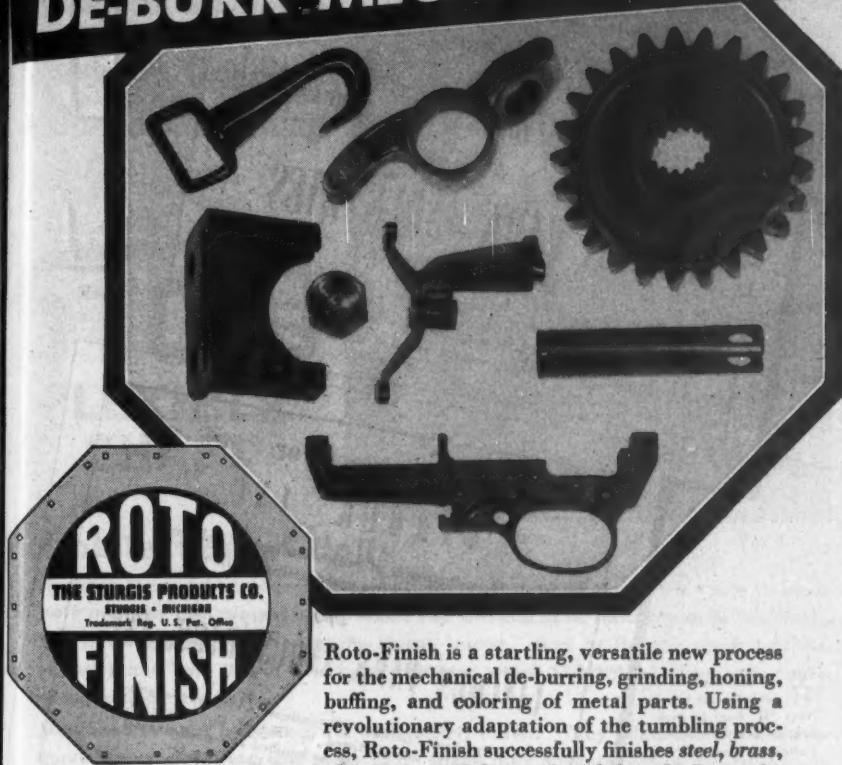
It gives full details on all models of DI-ACRO Shears, Brakes, Benders, and many examples of parts made with "DIE-LESS DUPLICATING."



O'NEIL-IRWIN MFG. CO.

306 8th Ave. S., Minneapolis 15, Minnesota

DE-BURR MECHANICALLY!



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FINISH

Roto-Finish is a startling, versatile new process for the mechanical de-burring, grinding, honing, buffing, and coloring of metal parts. Using a revolutionary adaptation of the tumbling process, Roto-Finish successfully finishes **steel, brass, aluminum, stainless and nickel steels**. It can be varied from a rough grinding action to the finest finishing.

Dozens of the large war producers report savings up to 96% over hand finishing methods. Roto-Finish is being used on castings up to 75 pounds down to small, delicate, intricate parts a fraction of an ounce. Hundreds of small parts can now be finished in a fraction of the time required before. Write for complete information, or send samples to be processed, without charge.

THE STURGIS PRODUCTS CO.
251 JACOB ST., STURGIS, MICHIGAN

Announcing

THE CHANGE IN OUR CORPORATE NAME
from
THE LINCOLN PARK TOOL and GAGE COMPANY
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LINCOLN PARK INDUSTRIES
INCORPORATED

The Management, Personnel and Policies of the
Lincoln Park organization remain unchanged

THE MERCER OF
CARBUR, INC.

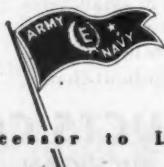
Manufacturers of Solid Cemented-Carbide
Rotary Files and Cutting Tools

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LINCOLN PARK INDUSTRIES, INC.

The name "Carbur" will continue to identify the tools
formerly manufactured by Carbur, Inc. However,
future production will be handled as a departmental
operation of Lincoln Park Industries, Inc.

★ A star has been
added to our Army-
Navy "E" flag. In mak-
ing this award, Robert P.
Patterson, Under Secre-
tary of War, writes, "You
have continued to main-
tain the high standards
that you set for your-
selves and which won you
distinction more than six
months ago."



LINCOLN  **PARK**
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SUCCESSOR TO LINCOLN PARK TOOL AND GAGE COMPANY
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TAKING THE TOOL TO THE JOB

*Speeds up Grinding,
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STOW FLEXIBLE SHAFT



Mobile Power Units . . .

In these times when every minute counts, you want your electric tools to have both mobility and ruggedness. When you wheel a Stow machine up to the work, you know you can depend on its sturdy motor. And its flexible shaft has the capacity and long life in heavy-duty service which STOW'S 68-year experience alone makes possible.

Stow mobile units operate from any electric outlet. They eliminate the need to move heavy work to a stationary tool. Often they operate where ordinary tools can't reach. Many interchangeable attachments are available, to fit the machine for almost any job.



STOW Manufacturing Co.

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HAND FINISHING

on parts for machine tools,
guns, planes, tanks, ships

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SWISS-PATTERN
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For more than 40 years, "American Swiss" Swiss-Pattern Files have consistently maintained a reputation for uniform hardness, clean sharp teeth, and long wear. For better, faster filing insist on "American Swiss" . . . 3,000 different sizes and patterns. Buy from our Distributor.

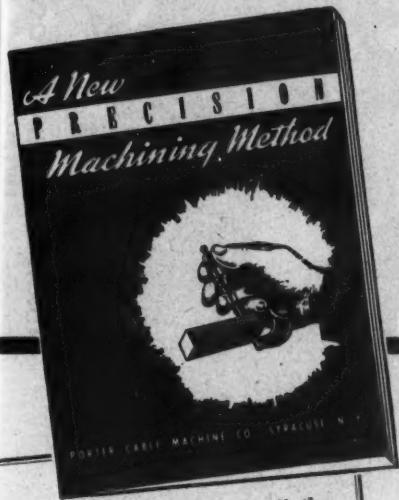
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ASK FOR THEM BY NAME

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Invitation to Faster, Better Finishing



Porter-Cable presents all the facts in its latest booklet, "A New Precision Machining Method." It is more than a catalog—it is virtually a treatise on Wet-Belt Surfacing, one of the greatest machining aids to come out in years. Send today for your copy—fill in the coupon below.

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PORTER-CABLE MACHINE CO.
300-2 Wolf St., Syracuse, N. Y.

Please send me a copy of "A New Precision Machining Method."

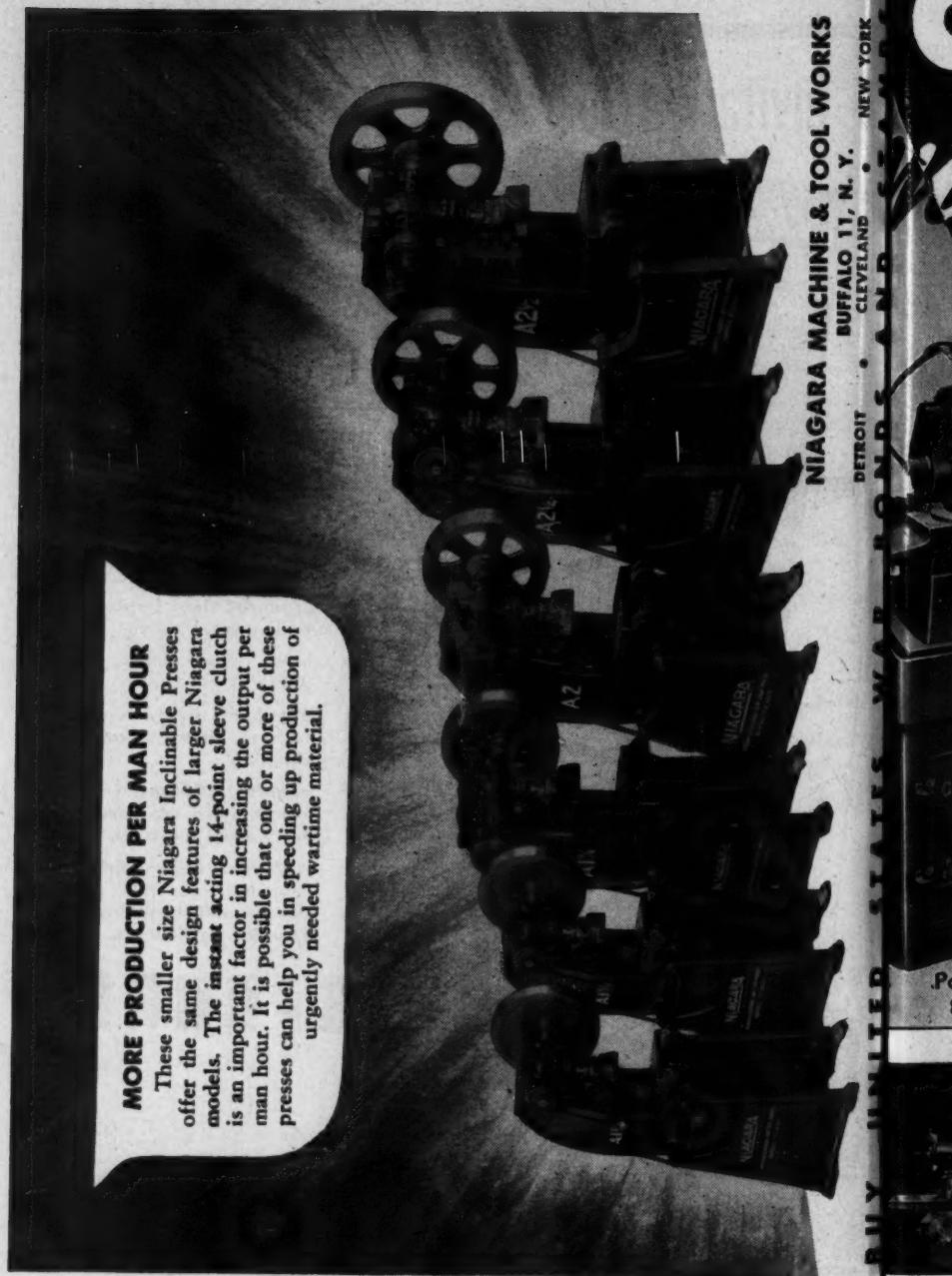
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MORE PRODUCTION PER MAN HOUR

These smaller size Niagara Inclining Presses offer the same design features of larger Niagara models. The instant acting 14-point sleeve clutch is an important factor in increasing the output per man hour. It is possible that one or more of these presses can help you in speeding up production of urgently needed wartime material.



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Makes a full line of
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EG-10
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Power or Hand Feed
8" Between Centers

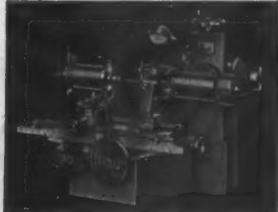
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Grinds $\frac{1}{8}$ " to 3" Holes



G-1 FLUTE GRINDER
HAND FEED ONLY



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TRS-1 CUTTER GRINDER

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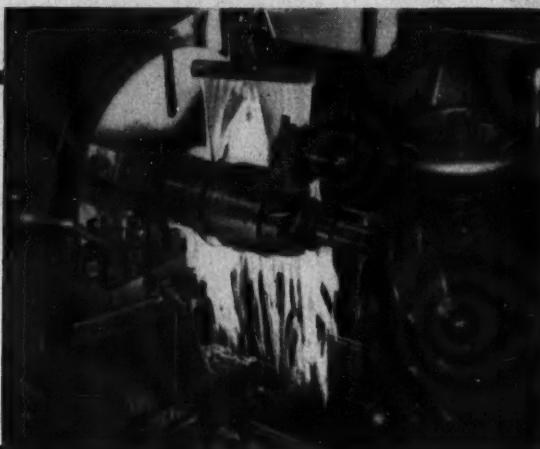


POWER TO ATTACK
relies on power to produce.
For increased production in
MACHINING use . . .

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... SINCLAIR CUTTING OILS and COOLANTS. They provide a diversified line of specialized oils adapted to every individual problem . . . promote higher speeds, greater precision and finer finish on difficult work . . . reduce power consumption and cutting oil cost.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)



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Comet 7000 Or Highlites[®] It's Got The STUFF[®]

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You Will Appreciate

- Poppet type.
- Resilient synthetic rubber seat.
- Positive seal.
- Leak-proof packing.
- Internal parts of stainless steel.
- New Heavy Duty solenoid.
- Compact design.
- Rugged construction.
- Longer life.
- High speed.
- Continuous duty cycle.
- Low current consumption.
- Permanent piping.
- Quiet operating.



The logo for Ross Air Control Valves is a black and white illustration. At the top, the word "ROSS" is written in large, bold, block letters. Below it, "Air Control" is written in a smaller, cursive script. At the bottom, "VALVES" is written in large, bold, block letters. A diagonal line runs from the top left to the bottom right. Below the line, a horse and rider are depicted in a dynamic, running pose, kicking up a cloud of dust. The rider is holding a whip. The entire logo is set against a background of horizontal lines and patterns that suggest a mechanical or industrial setting.

This ROSS #835

is a newly developed $\frac{1}{4}$ "-3 or 4 way, heavy duty, industrial type valve for the control of double acting air cylinders . . . may be used for ordinary applications or at speeds as high as 400 cycles per minute on a continuous duty basis . . . it's the valve you've been asking for . . . write for detailed information.

ROSS *Operating* **VALVE** **CO.**

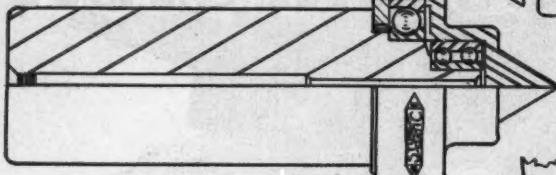
6484 Epworth Boulevard : Detroit 10, Michigan

A SIZE AND TYPE FOR EVERY OPERATION

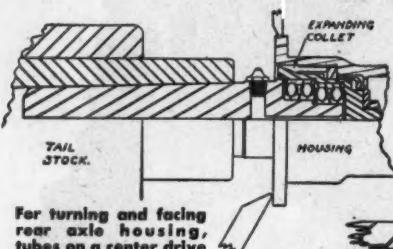
Special

Live Centers

Send us your specifications and blueprints—
We will see that your job is set up with the
right **LIVE CENTER**.



Special live center used
for turning various sizes
of tubing, pipe, etc.

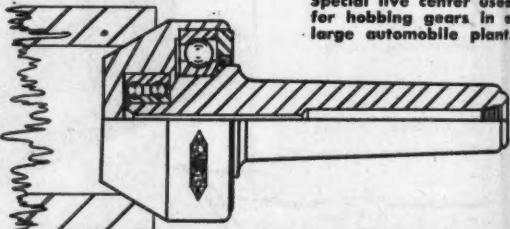


Special live center used
in Warner & Swasey
screw machines.



Special live center used
for hobbing gears in a
large automobile plant.

For turning and facing rear axle housing, tubes on a center drive lathe using a live center on each end, machining both ends simultaneously.



Special live center
for turning extra
large tubing.

Characteristic of the design of all **STURDIMATIC LIVE CENTERS** is a low overhang and a slight cushioning action . . . that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock. Prompt deliveries on high priorities.

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"IN DECEMBER HE WAS SANTA
IN THE TOY STORE THIS
MONTH HE TOOK HIS GRANDSON'S
PLACE AND HE'S DRIVING
SCREWS LIKE A 21-YEAR OLD.
FOR THE PLANT WHERE HE WORKS USES
THE RECESSED HEAD
SCREW THAT MAKES
DRIVING DUCK SOUP...
IT'S PHILLIPS



Anyone can drive Phillips Screws!
Today, screw driving is one production job anyone can tackle without any special talent or training. The job that once called for strong arms and skilled hands now is a cinch for the operator who never tackled a screw driving job before!

It's the Phillips Recessed Head Screw that does the trick! With Phillips Screws, the greenest operator quickly becomes as skillful as a veteran. No fumbling . . . no wobbly starts . . . no slant-driven

screws or dangerous screw driver skids. Workers turn out flawless jobs every time — and faster than ever before. Time studies prove that Phillips Recessed Head Screws step up screw driving speed as much as 50 per cent!

Imagine what this means to you in terms of man-and-training-hours saved . . . of increased production . . . finer workmanship. Then match these important advantages against slotted head screws — or any other type you may be using.

PHILLIPS *Recessed Head* **SCREWS**

WOOD SCREWS · MACHINE SCREWS · SELF TAPPING SCREWS · STOVE BOLTS

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Midford Rivet and Machine Co., Midford, Conn.
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New England Screw Co., Keene, N. H.
The Charles Parker Co., Norridgewock, Conn.
Parker-Kalon Corp., New York, N. Y.
Pewabic Screw Co., Pontiac, Ill.

Pewell Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Stewart-Burdell & Ward Bolt & Nut Co., Port Chester, N. Y.
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TO MAKE WORKING
QUOTAS AND
PEACETIME PROFITS

Driver Starting: Driver point automatically centers in the Phillips Recess . . . its snugly, fumbling, wobbly starts . . . that driving are eliminated. Work is made trouble-proof for green hands.

Driver Driving: Spiral and power driving are made practical. Driver won't slip from recess to spoil material or injure worker. (Average time saving is 50%.)



Driver Driving: Turning power is fully utilized. Workers maintain speed without tiring.

Driver fastening: Screws are set-up uniformly tight, without bursting or breaking of screw heads. The job is stronger, and the ornamental recess adds to appearance.





From Parts Prints to Press in 8 Weeks



— No small task in these days of priorities, delays and last minute changes. Barth of Cleveland gives high credit to

"HARDSTEEL" DRILLS

which enabled them, on the signal equipment dies illustrated, to save many man hours and to keep an important delivery date.

With a "HARDSTEEL" Drill in an ordinary drill press and following simple instructions regarding speed and pressure, any mechanic can easily drill clean holes through steel hardened by any process—40 Rockwell "C" or harder.

A time saver when last minute emergency changes come through on hardened dies and parts. And the only way to assure matching of hardened parts at assembly—drill after hardening.

Used throughout industry for parts recovery and for production work—made in all sizes $\frac{1}{8}$ " to 1".

**BLACK DRILL CO. 1400 East 222nd St
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**"YOU HARDEN IT...WE'LL DRILL IT"
with HARDSTEEL**

Complete information and practical operating suggestions in the "HARDSTEEL" Operating Manual. Copy free on request.



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DRILLS • REAMERS • TOOL BITS • SPECIAL TOOLS

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TO VICTORY are the Armed Forces of ourselves and our Allies. MID-WEST HYDRO-PIERCE UNITS are aiding both in bringing VICTORY closer by saving considerable TIME and MANPOWER in piercing parts for many types of land, sea and air weapons. Since long before PEARL HARBOR, MID-WEST HYDRO-PIERCE UNITS have been STANDARD for the simultaneous piercing of holes in any direction in intricate shaped stampings that are not easily accessible by ordinary press practice.

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HYDRO-PIERCE INC.

WRITE US
concerning your WAR
and POST-WAR pierc-
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perience and large
staff of able engineers
are at your SERVICE.



Prevent needless falls and accidents caused by slippery, oil-soaked floors with ABSORBO, the granular compound, that provides safe footing on floors subject to oil or grease spills.

SAFETY UNDERFOOT!

Here's How It Helps:

ABSORBENT

The sponge-like granules quickly absorb oil or grease up to 45% to 50% of their weight.

EASILY APPLIED

Just sprinkle Absorbo on the oil-soaked floor or where oil or grease spills are likely to occur, and safe traction is provided immediately.

SWEEPS CLEAN!

Allow it to remain on the floor a few minutes or as long as desired. Sweep up, and then note the clean, dry surface.

NON-COMBUSTIBLE

Approved by Underwriters' Laboratories as a Class 1 non-combustible. Even when thoroughly oil saturated, it resists burning and retards fire from spreading.

Send for trial 50-lb. bag at \$2.75 F.O.B. Newark, with unconditional money-back guarantee if not satisfactory. Substantially reduced prices for quantity orders.



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"S-M" Molybdenum

For hand sawing and for light and heavy power sawing, these blades are of special temper for high speed cutting and for hard metals. They have a remarkable record of performance and low cost per cut.

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18-4-1 Tungsten all hard blades for light and heavy power sawing to assure fast production on high alloy metals, stainless steel, phosphor bronze, tool steels, chrome steel, Monel metal and the like.

STARRETT is a dependable name to tie to on Hacksaws as well as Tools. Ask us for recommendations as to the one best blade for any given job, and ask your mill supply distributor for **STARRETT** Hacksaws.



THE L. S. STARRETT CO. • ATHOL • MASSACHUSETTS • U. S. A.

World's Greatest Toolmakers

Now, with Service Star

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
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orders.

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1944

No Leaks No Levers No Packing

Precision made of
bar brass and
stainless steel.



Note powerful double
grip afforded by long
extra heavy ferrules,
machine-formed over
special shoulder on
shank.



Jewelers Model FA AIR-O-CHEK — favorite
of women war workers because of small size.
Furnished with $\frac{1}{8}$ " or $\frac{1}{4}$ " female IPT.



Standard Model FA AIR-O-CHEK. Furnished
with $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ or $\frac{1}{2}$ " female IPT.



Large Model FA AIR-O-CHEK. Furnished
with $\frac{1}{2}$ " female IPT.

Model FA AIR-O-CHEKS come completely
assembled with long, extra heavy double-
grip ferrules illustrated, ready to screw on
male IPT.

The unapproached air saving, ease of
operation, and low maintenance afforded
by AIR-O-CHEK Air Guns stem from a
basic patented feature — the ball and
socket connection between the internal
lever and the valve.

This exclusive construction affords leverage
to open the valve with a slight flex
of the hose. Air shut-off is instant and
positive when the hose is released, regard-
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RESULTS TALK. Install an AIR-O-CHEK and compare results with the best
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For Merchant Marine Service

GEMCO

Multi-Purpose SHAPERS

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The filing class shown is the date line on telegrams and day letter is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination.

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PRESIDENT

W. H. CARLTON
CHIEF ENGINEER OF THE BOARD

J. G. WILLIAMS
PRESIDENT
FIRM VERSUS CO.

1940

SYMBOLS

SL=Day Letter

WT=Overnight Telegram

EC=Express Cable

WT=Cable Night Letter

23 DEC

4-22-0570

WESTERN UNION⁽⁴¹⁾

The filing class shown is the date line on telegrams and day letter is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination.

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SYMBOLS

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EC=Express Cable

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23 DEC

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• AWM54

CTA113 GOVT NL=CT WASHINGTON DC 18

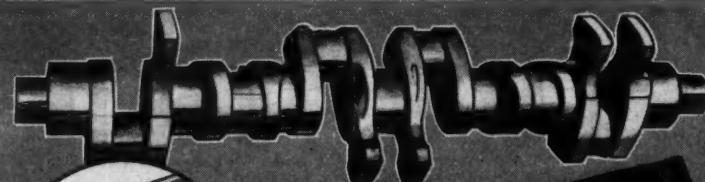
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1519 SOUTH 10TH STREET STL.

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CITED IN A REPORT FROM THE "USS CARD". THE "BABY FLAT-TOP"
WHICH TOGETHER WITH HER ESCORT SHIPS WAS RECENTLY AWARDED
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W. B. YOUNG REAR ADMIRAL (SC) USN CHIEF
OF THE BUREAU OF SUPPLIES & ACCOUNTS.

GEMCO Multi Purpose

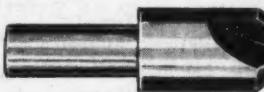
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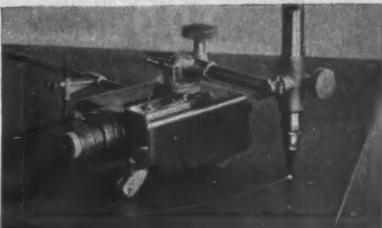
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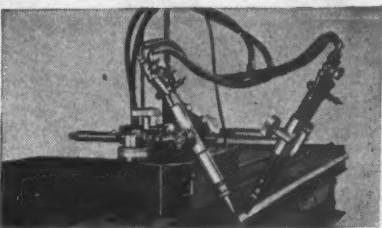
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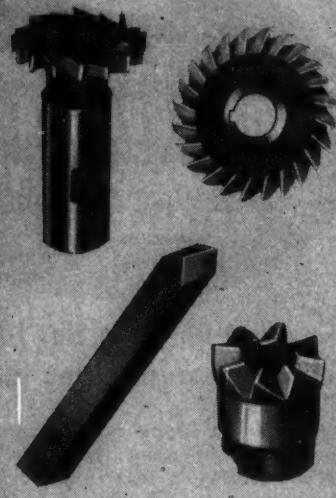
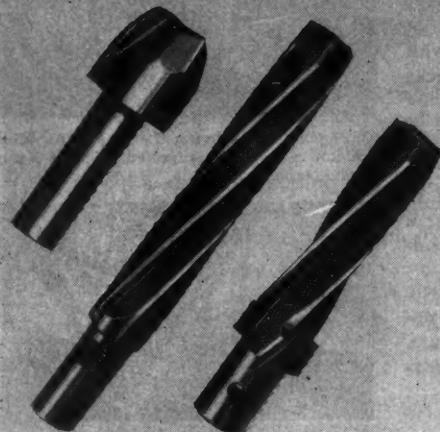
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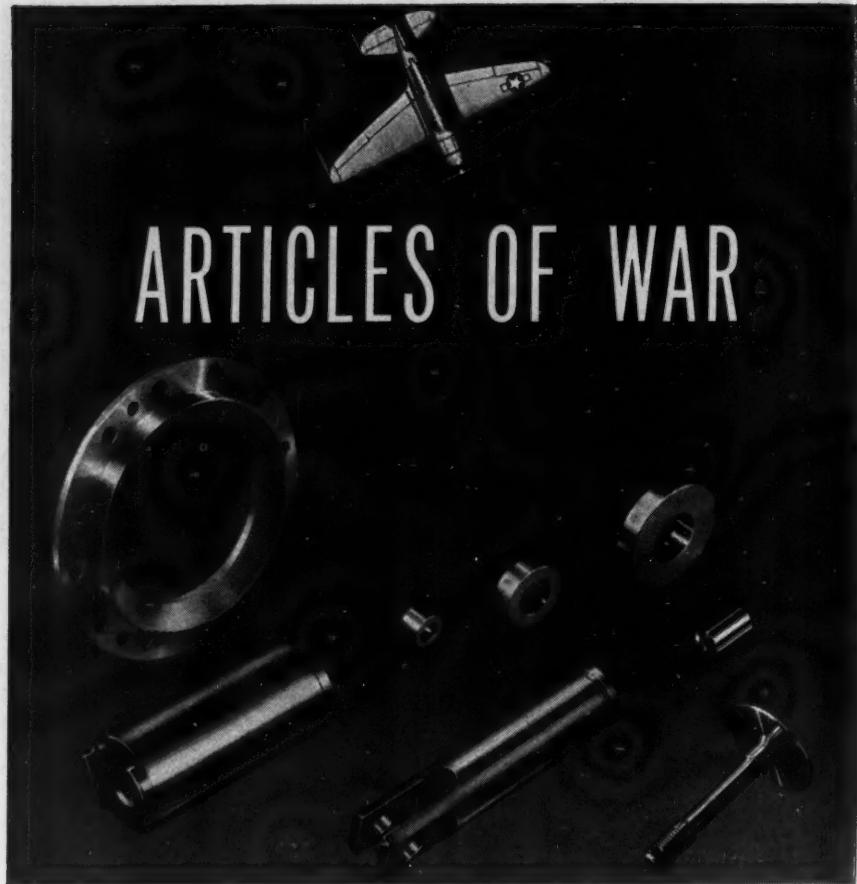
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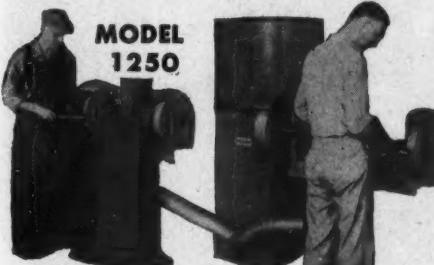
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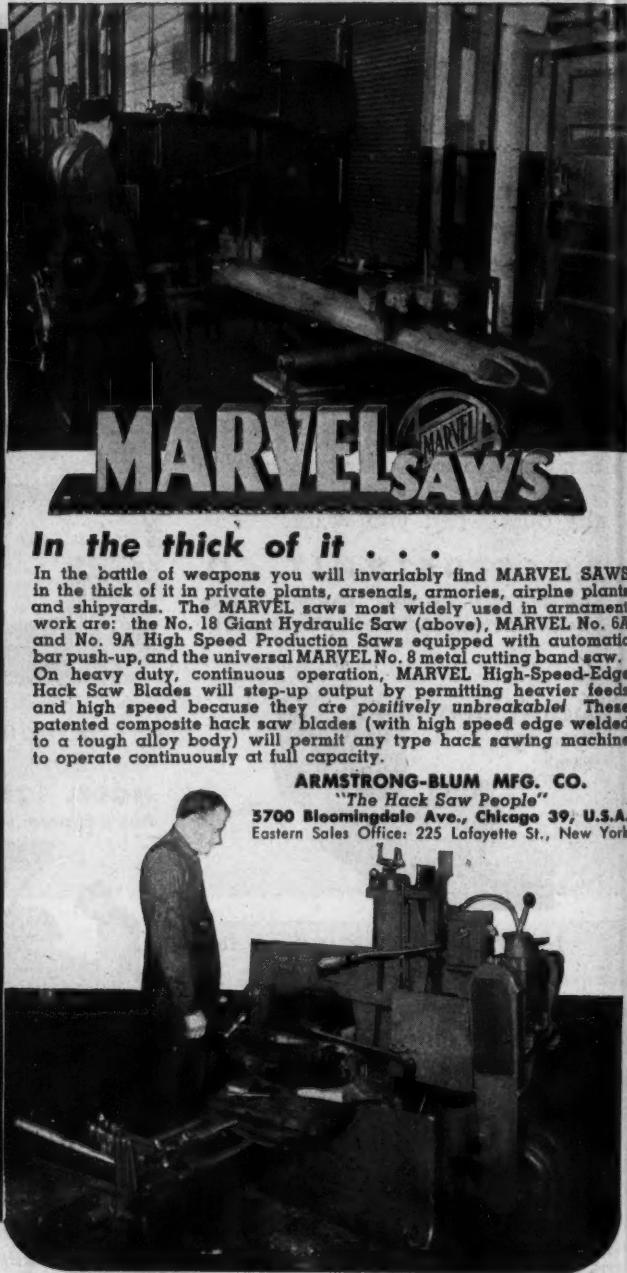
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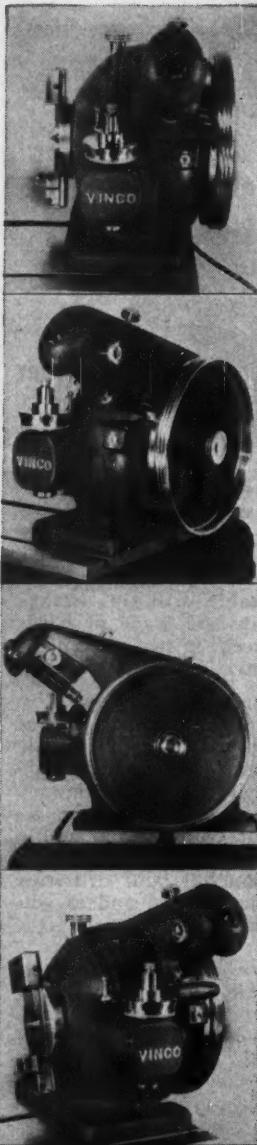
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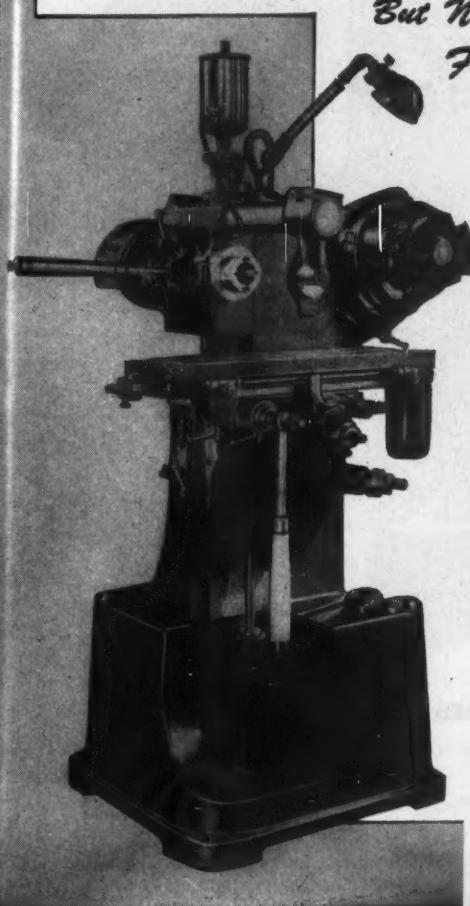


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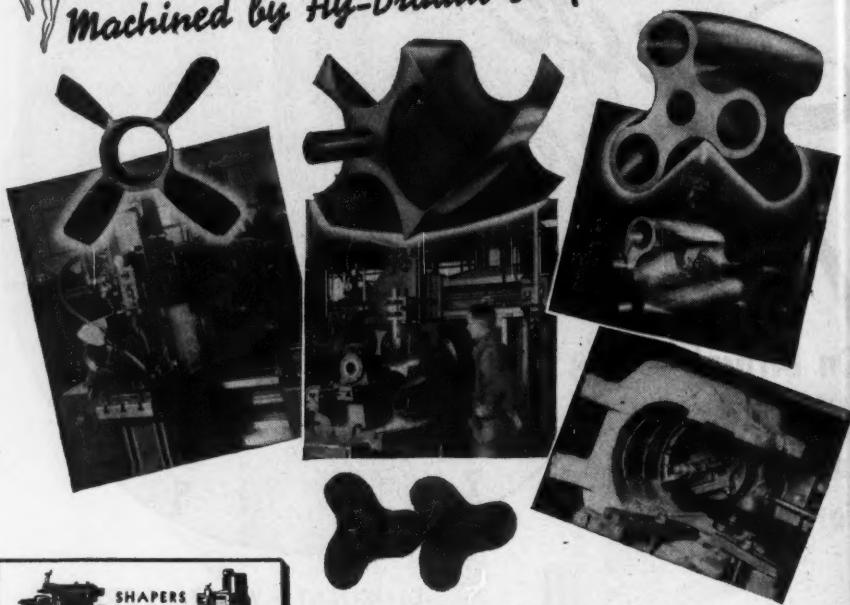
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None of us alive today will live to see the world using a common language. Yet the scales of the "ROCKWELL" Hardness Tester are used and understood all over the world, due to the use of our tester by metallurgical and mechanical men everywhere.

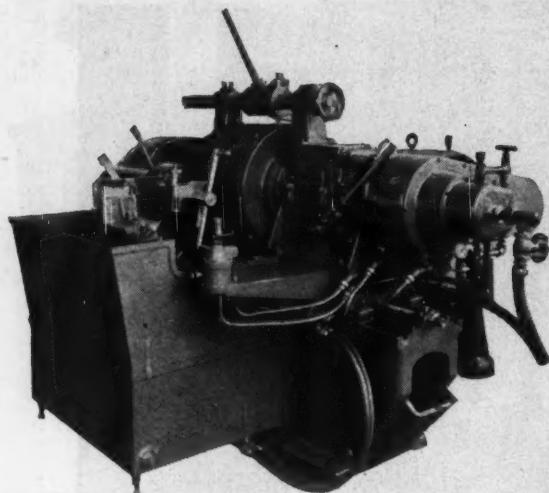
383 Concord Avenue,
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February, 1944

WILSON
MECHANICAL INSTRUMENT CO., INC

MODERN MACHINE SHOP 69

How the Well-Equipped Shop Handles PARALLEL SURFACE GRINDING JOBS



For full information on Besly Titan Steelbacs, send for this Booklet.

Grinding two parallel surfaces simultaneously is a common enough operation. But as handled in the well-equipped shop on a Besly Double Spindle Grinder the results are anything but common. The difference, in terms of better production, greater accuracy and lower operating expense, is Besly engineering experience.

Besly's experience, extending over half a century, explains the company's success in matching the right machine design and the right abrasive to each of many different grinding operations and metals, including the hardest of the modern alloys. This experience, plus Besly's outstanding record of continuing service to customers long after the initial sale, are sound reasons for consulting Besly engineers on any current and postwar grinding problems.

For Example . . .

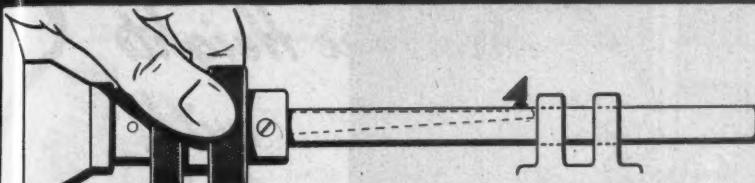
The model 218-20 inch Besly Double Spindle Grinder shown delivers accurately ground work for long periods with infrequent maintenance. In this machine, the only parts to slide to and away from the work are the spindle, bearings and the special quill or sleeve in which they are mounted. The quill moves freely on a grease-tight slide. No grit, dirt or water can enter to cause wear—and consequent major overhauls. This basic design feature also permits locking the tie bar at the top in a fixed position, adding to machine rigidity and promoting accuracy of work.

BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TITAN ABRASIVE WHEELS • BESLY TAPS

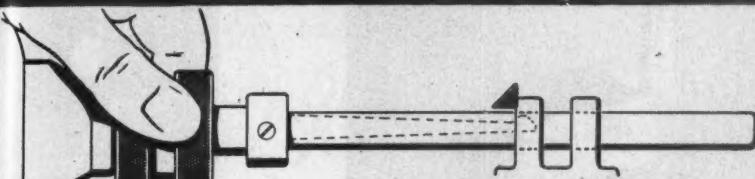
CHARLES H. BESLY AND COMPANY • 118 N. CLINTON ST. - CHICAGO, ILL.

How to deburr holes faster!

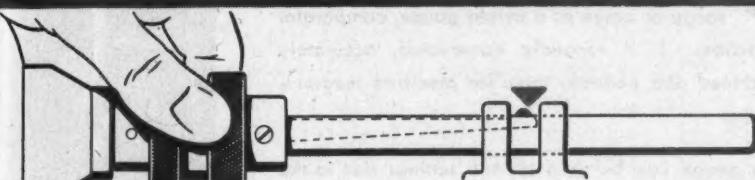


1. Insert Nobur tool in any machine spindle and deburr outside surface of work.

Works like a drill—operator works with complete safety—parts can be burred as fast as they can be handled by operator.



2. After outside surface is deburred, slide knurled sleeve back to retract blade.



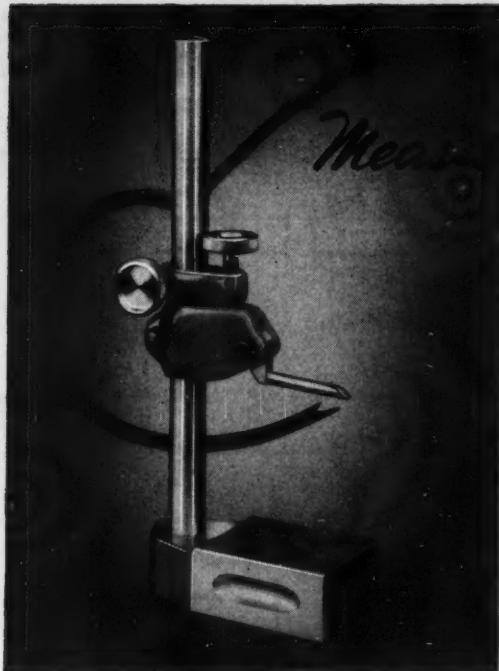
3. Move work on over retracted blade and deburr inside surface.

Double-edged cutting blade thus instantly removes burrs around holes in flat or curved surfaces of single or multi-walled parts—smoothly and accurately.

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NOTE
All Nobur tools
are now
furnished with
pilot shafts
hard chrome
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with
Accuracy

The Dickerman Height Gauge has a wide range of usage as a height gauge, comparator or scribe. It is ruggedly constructed, accurately machined and perfectly fitted for precision measurement.

This gauge can be used for fine settings due to the differential screw adjustment. Measurement in the tenths of thousands is quickly and accurately attained.

Made in three column lengths — 10" - 14" - 18".

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Above: Comparitor use with standard dial indicator.



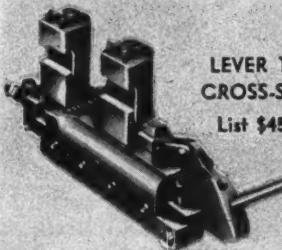
Above: Scribe use.
Below: Height gauge use.



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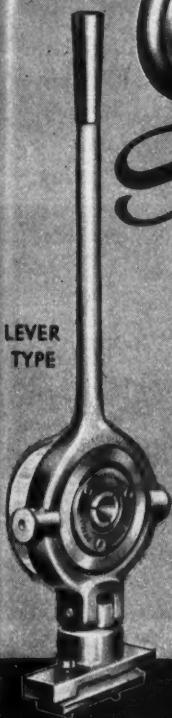
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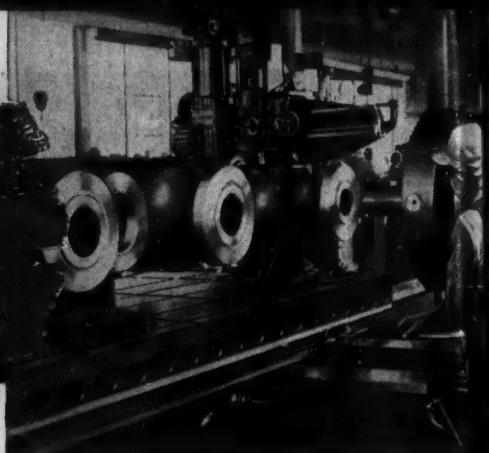
PRECISION COLLET DIVISION

265 Canal Street, New York 13, N.Y.

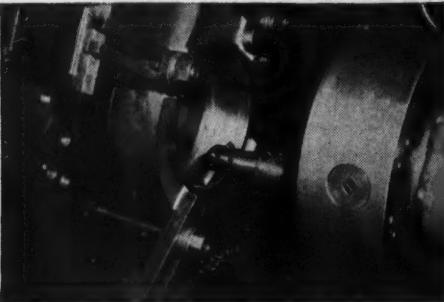
How to Do Jobs Like These on your Horizontal Boring Mill

G. & L.
**Continuous Feed Facing
and Boring Head Increases
Flexibility...Reduces Settings**

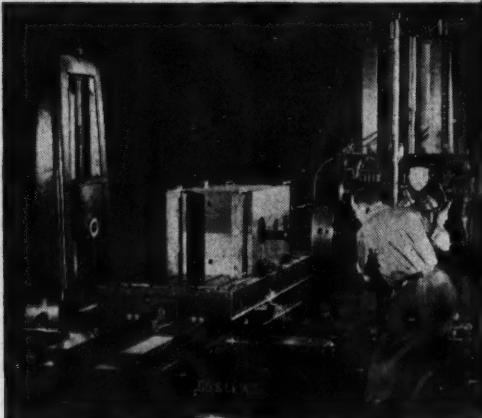
Here are but three of many different jobs being simplified through the use of the G. & L. Continuous Feed Facing and Boring Head. Many additional operations and combinations of operations can be performed with equal simplicity. Perhaps much of your work can be simplified with this attachment. Write for additional data today.



BORING AND FACING of large one-piece valve bodies. Additional operations include counterboring and back facing. Flange faces are as large as $16\frac{1}{2}$ " dia. Facing and boring can be performed simultaneously.



THREADING one end of a large connecting rod. Operations consist of rough, semi and finish boring, counterboring and threading a 12" dia. bore.

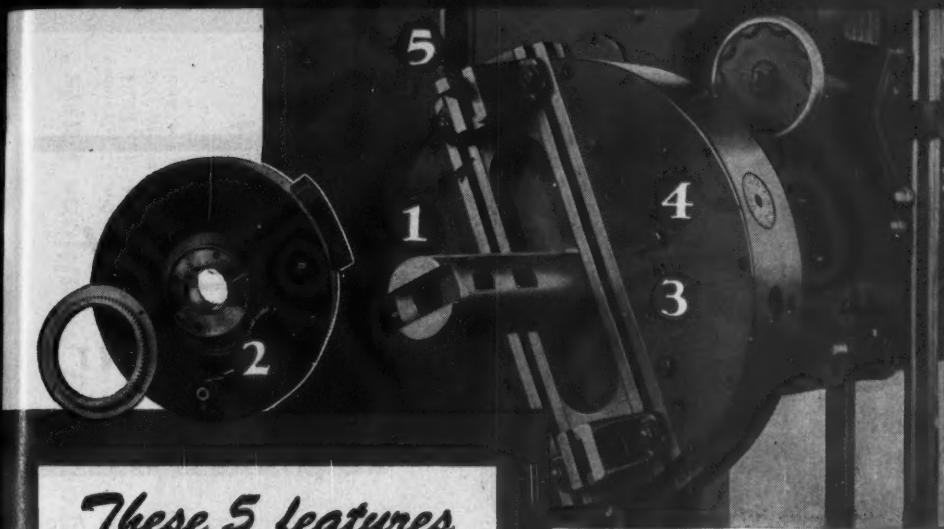


BORING FORGING DIES in assembly. Both halves are machined simultaneously with a saving of 200 hours over the previous method.



GIDDINGS & LEWIS

146 DOTY STREET



*These 5 features
will increase the flexibility
of your*

G. & L. HORIZONTAL

The G. & L. Continuous Feed Facing and Boring Head with main spindle of the machine extended through the hardened steel bushing of the attachment. Also shown is the stationary flanged gear which drives the gear train.

Because of its unusual design and construction, the continuous feed facing and boring head makes possible many operations and combinations of operations not ordinarily performed with the horizontal boring, drilling and milling machine.

A wide range of standard tools is available for use with this attachment. Special tools can be designed and built for specific applications:

- 1 **Tool Slide . . .** has six separate power feeds ranging from .009" to .118" per revolution of head.
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- 4 **Micrometer Adjustment . . .** graduated to .001" for tool slide adjustment.
- 5 **Two Tool Holders** with $\frac{3}{4}''$ tool bits furnished as standard equipment.

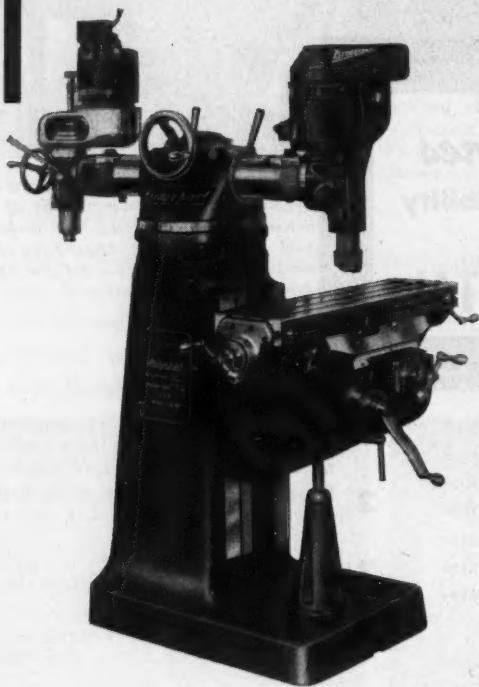
WRITE FOR ADDITIONAL DATA—A complete description of this attachment is contained in this booklet. When requesting your copy please indicate your business connection and the type and size of machine used. Ask for Bulletin No. MM-24.



MACHINE TOOL COMPANY
FOND DU LAC, WIS.

Announcing —

THE NEW *Bridgeport*
SHAPING ATTACHMENT



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● The Bridgeport Shaping Attachment is now available.

With this attachment your Turret Miller serves a double purpose.

Milling, drilling, and boring is accomplished with the Milling Unit and in 30 seconds the Shaping Attachment can be indexed in position over the table for intricate shaping or slotting operations at all angles.

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BRIDGEPORT MACHINES, INC.

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producing Munitions Parts

This is the famous Thompson No. 120 Grinder in a large plant in midwestern United States, (fully hydraulic) set up for finish grinding units for Anti-Aircraft Guns.

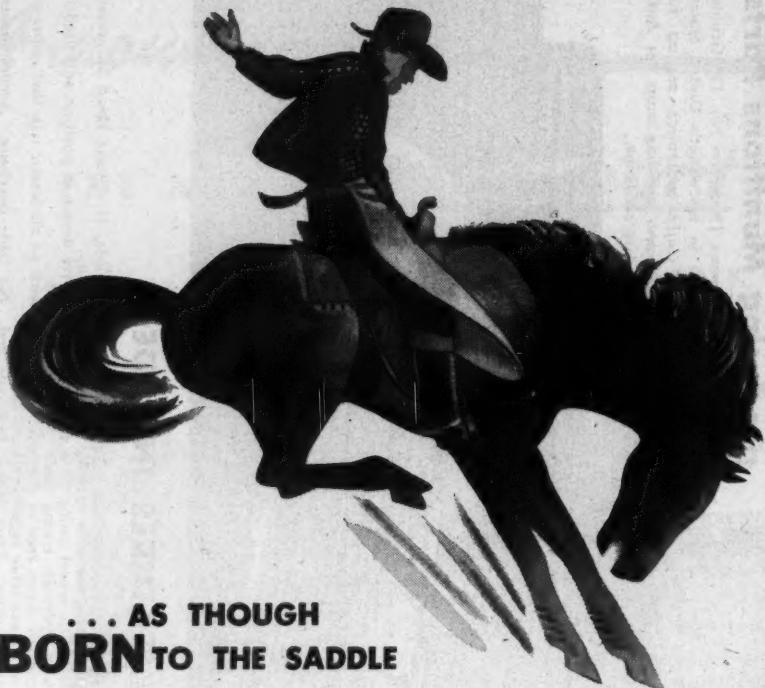


Thompson FEATURES INCLUDE:

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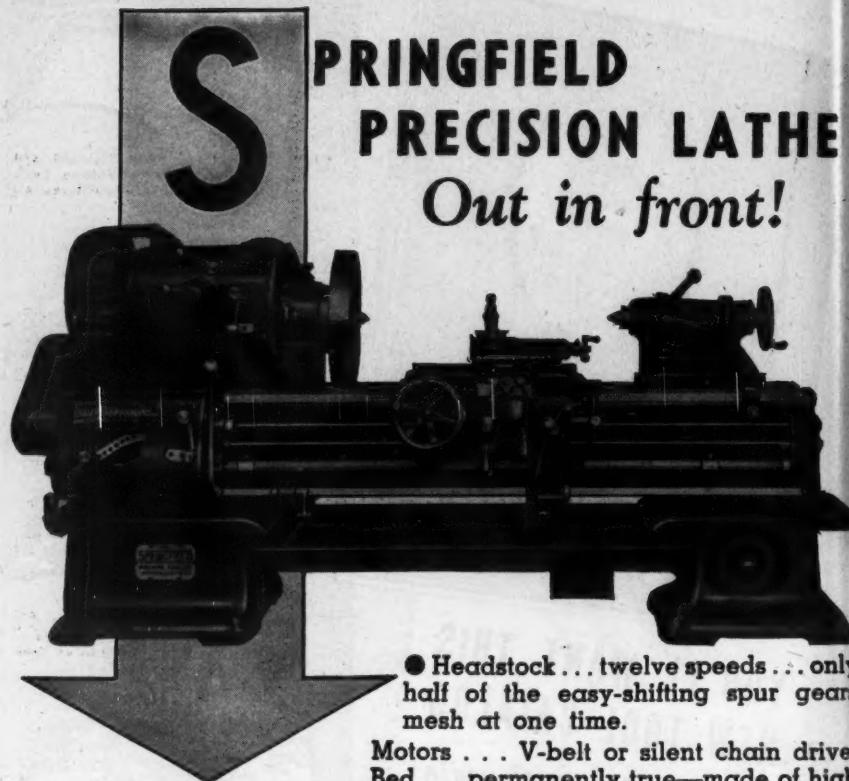
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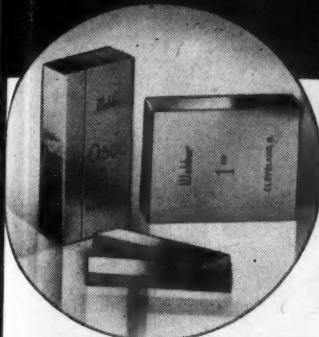
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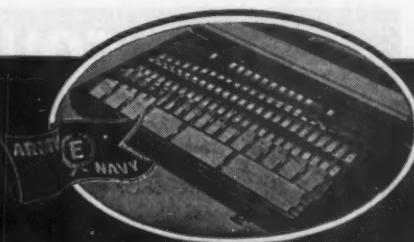
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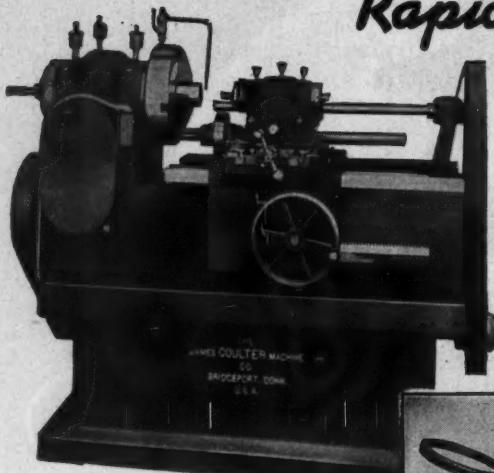
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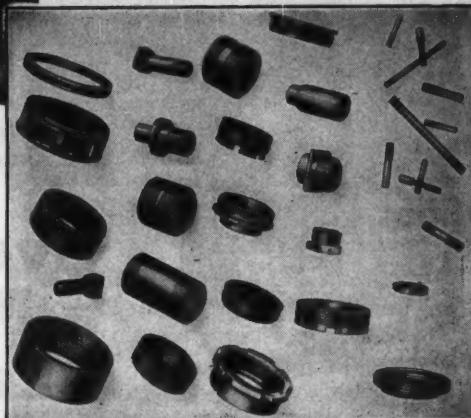
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Type "H"



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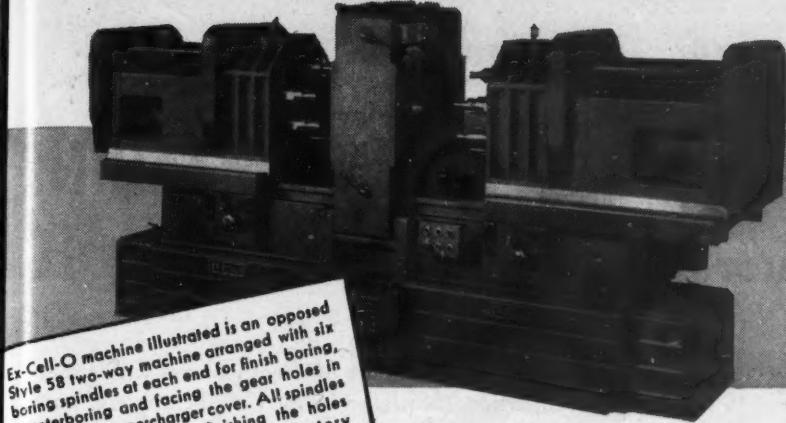
Taps that stand the gaff like Bath Taps can be counted on to provide accuracy and long wear.

Bath tap blanks are hardened without threads — then shanks, major diameters and flutes are ground on centers, and, finally, the threads are ground from the solid on Bath patented machines.

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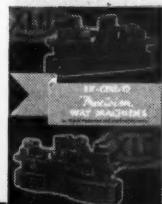
Ex-Cell-O machine illustrated is an opposed Style 58 two-way machine arranged with six boring spindles at each end for finish boring, counterboring and facing the gear holes in an aluminum supercharger cover. All spindles operate simultaneously, finishing the holes within .0005" at a highly satisfactory production rate.

The units have 20 inches of table travel and 15 1/2 inches between the ways. Each spindle is individually adjustable for quick setting. In this particular application all centers are set to a master gage, which, in effect, is a master for the part itself.

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INCREASING PRODUCTION ... with new economy!

Ex-Cell-O Unit-type Precision Boring Machines Bring Added Practical Features

Ex-Cell-O has developed standard boring units, each a complete machine in itself, yet by means of heavy flanges and bolts these units can be bolted singly or in multiples to a stationary center section, resulting in a multiple precision boring machine. Note these advantages:

It is still a precision boring machine. Bores may be finished in tenths of thousands as before, yet units may be mounted in multiples and at angles, all operating simultaneously toward the center section.

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Each way or unit has two feeds and a dwell in forward and reverse direction, and each can be controlled individually or by a central control button in conjunction with all other units hooked into the electrical panel. It is completely automatic except for loading and unloading.

More than most semi-special machines, this Ex-Cell-O machine incorporates desirable features in flexibility and production, for war work today and peacetime products tomorrow.

EX-CELL-O CORPORATION • DETROIT 6, MICH.

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10 to 30 new sharp cutting edges on the circular bit without grinding or changing set-up. Grinding time saved pays for cost of tool before regrinding is necessary (and then grinding time takes only one minute).



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\$10

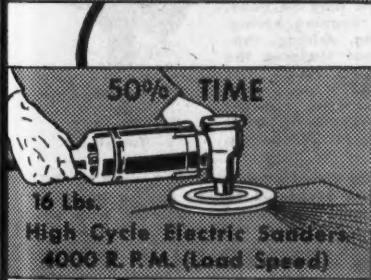
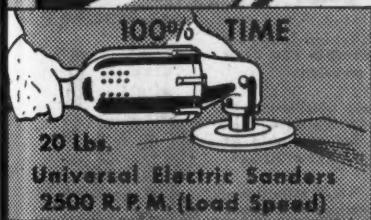
...includes tool holder
and two Shearcutter Bits

SHEARCUT

TOOL CO.
Dept. MMS-2
19600 Sherman Way
Reseda, California



**DOWN WENT HER
SANDING TIME 50%**



Sight of that Jap-blaster, going down the ways, warms my heart—especially since the R.A.E. and I had a hand in speeding her construction.

It was in sanding her welded battery racks. Six men were using universal electric sanders—9" pads—at a speed that dropped to 2500 R.P.M. under load. Maintenance cost was high.

They called in the Rotor Application Engineer.

He surveyed the job and recommended the *right tools* for it—Rotor High Cycle Electric right-angle sanders. They hit it up at a load speed of 4000 R.P.M. Results:

1. Because of higher speed under load, three Rotors now do the work of the six universals.
2. Man-hours were cut 50%.
3. Rotor Sanders weigh 4 lbs. less; are easier to handle.
4. Tool maintenance is less.

Perhaps your sanding and grinding time and costs could be given a similar launching to a sub level. We're at your service . . . gratis of course.

Yours for the *right tool*.

HIGH CYCLE O'TOOL

THE ROTOR TOOL CO.
CLEVELAND, OHIO



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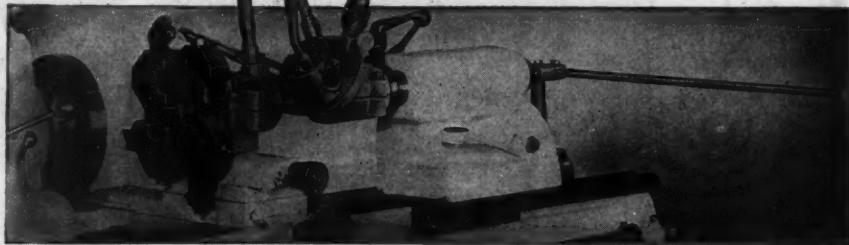
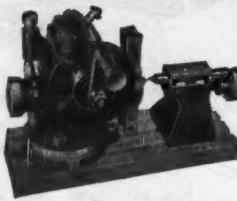
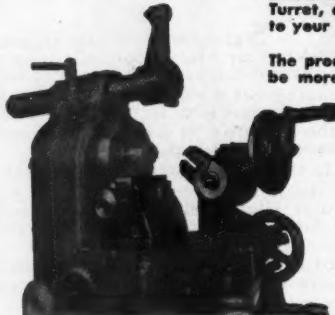


Photo above shows Jefferson Turrets on 16" lathe



7 1/2" Swivel Base Dividing Head—

Immediate Delivery

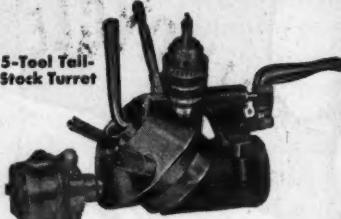


6" Tilting Dividing Head with 3 Indexing Plates and Tailstock—
Immediate Delivery.

Some territories still open
for dealers and salesmen.

Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

5-Tool Tail-
Stock Turret



PAT. PENDING

Yes, it's as easy as that! You simply attach the Jefferson Tail-Stock Turret, the Jefferson Tool-Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.



4-Tool
Tool-
Post
Turret

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

TURRET DELIVERIES IN 6 DAYS

JEFFERSON

MACHINE TOOL CO.

750 W. Fourth St., Cincinnati, Ohio

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyrotary Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

PRECISION

IS BUILT INTO EVERY OUNCE OF THESE MEEHANITE METAL SURFACE PLATES

HAND SCRAPED

Meehanite Metal is of fine close grain, uniform texture, unusual strength and solidity . . . metallurgical qualities that make high precision surface plates. These are one-third heavier than any other quality plates, and the weight is scientifically distributed by the honeycomb base. The surfaces are handscraped to extremely close tolerances.



LOOK
FOR THIS HONEYCOMB BASE!

SIZE	APPROX. WEIGHT	HEIGHT	TOLERANCE	NET PRICE
3½x4	5 Lbs.	2½"	.0001"	\$ 12.50
6x 6	11 "	2½"	.0001"	19.00
8x 8	22 "	3"	.0001"	23.00
8x12	38 "	3½"	.0001"	35.00
9x12	40 "	3½"	.0001"	35.00
10x10	43 "	3½"	.0001"	35.00
12x12	50 "	3½"	.0001"	43.00
12x18	85 "	4"	.0001"	68.00
14x18	100 "	4"	.0001"	75.50
16x16	100 "	4"	.0001"	75.00
18x18	140 "	4½"	.0001"	98.00
18x24	200 "	5"	.0001"	133.00
18x36	310 "	6¼"	.0002"	174.00
20x20	160 "	4½"	.0001"	123.50
20x30	325 "	5¼"	.00025"	190.50
24x24	334 "	6½"	.00025"	180.00
24x36	475 "	7"	.00025"	275.00
30x36	510 "	7"	.00025"	345.00
30x60	1425 "	10"	.00025"	596.50
31x78	2100 "	10"	.0003"	827.00
48x72	3600 "	11"	.0003"	1054.00
48x96	6000 "	12"	.0005"	1468.00

FOR PROPELLER INSPECTION: RIBBED PATTERN

8x42	238 Lbs.	6"	.0001"	98.00
10x36	225 "	6"	.0001"	115.70

Other sizes to specification. Angle plates and straight edges of Meehanite Metal also available. Good deliveries on most sizes. Write for folder.

ACME TOOL COMPANY

202 CHURCH STREET
NEW YORK 13, N. Y.

Immediate Shipment STEEL BOXES FOR YOUR PRODUCTION NEEDS



STYLE 300 STACKING BOX



STYLE 700 STACKING BOX



STYLE 600 STACKING BOX



STYLE 500 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handles each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301—6"x 9" x $\frac{1}{2}$ " 20 ga., \$.55 Each

No. 302—8"x12" x4" 20 ga., .60 Each

No. 303—9"x13 $\frac{1}{2}$ "x $\frac{1}{2}$ " 19 ga., .75 Each

A light weight box designed for quick identification of contents. Will stack with No. 303. Finished olive green enamel, baked on.

No. 703-OG—9"x13 $\frac{1}{2}$ "x $\frac{1}{2}$ "—19 ga., \$.95 Each

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and reinforce box at point of maximum wear.

No. 601—10"x16"x6" 18 ga., \$.95 Each

No. 602—12"x18"x8" 16 ga., 1.25 Each

Perfect for the handling of small parts. Open front makes contents easily accessible when boxes are stacked. Will stack with No. 601.

No. 501—10"x16"x6" 18 ga., \$1.15 Each

No. 502—12"x18"x8" 16 ga., 1.50 Each

Prices F.O.B. Factory, Philadelphia—Any Quantity! Order Today—Write, Wire or Phone.

AMERICAN METAL WORKS, INC.

1501 GERMANTOWN AVENUE

PHILADELPHIA 22, PA.



For
faster
delivery

specify **DEARBORN** **GAGE**
BLOCKS



Distributors in the principal cities
of the United States and Canada.

THE DEARBORN GAGE COMPANY is able to make faster deliveries on their gage block sets, since the introduction of increased production facilities in their plant.

For those manufacturers who are in urgent need of Dearborn's Chromium Plated Gage Block Sets the Dearborn Gage Company guarantees reasonably prompt deliveries.

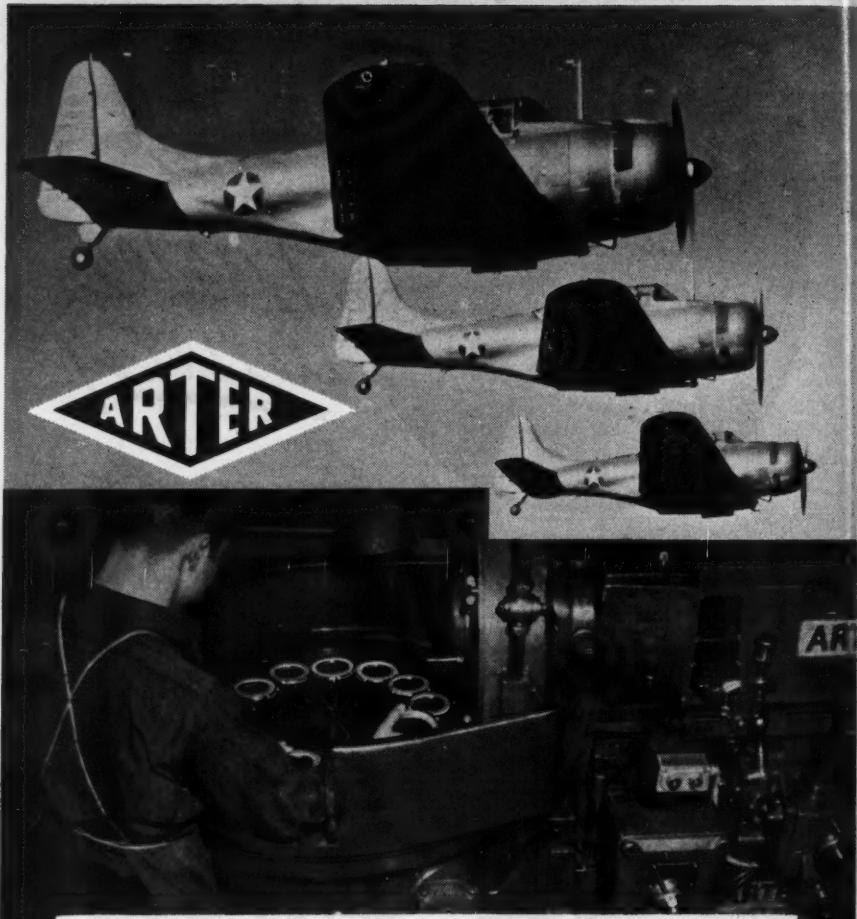
WRITE FOR THIS BOOK

This Booklet entitled, "How To Make Your Standards Last Longer," will give you some valuable information on the proper care of gage blocks. Please write on your company stationery giving your title or position, and this booklet will be sent to you.



DEARBORN GAGE CO. 22038 BEECH STREET
DETROIT, MICHIGAN

Originators of Chromium Plated Gage Blocks



Several hundred ARTER ROTARY GRINDING MACHINES are employed by Wright Aeronautical Corporation in the tremendous production of aircraft for war and victory. To build the necessary horsepower into an aircraft engine requires machinery that produces the highest degree of perfection.

Photo—Douglas SBD "Dauntless" U. S. Navy bomber—powered by a Cyclone 9 of 1000 horsepower, manufactured by the Wright Aeronautical Corporation, Paterson, N. J.

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

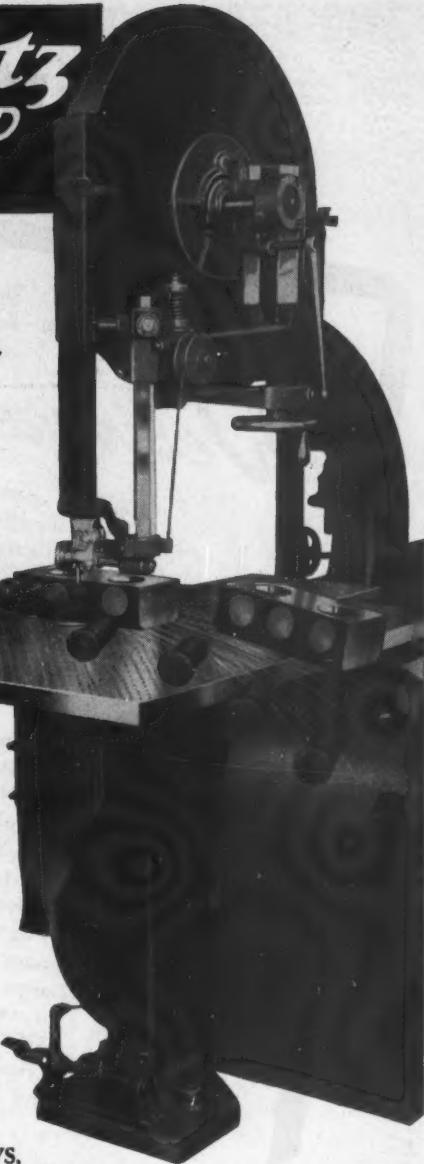


Tannewitz VARIABLE SPEED BAND SAWS

*Are
Metal-Cutting,
EXPEDITERS!*

Removing gates and risers from steel, cast iron, manganese bronze, hard and soft brass, aluminum and magnesium castings, as well as many other metal cutting jobs, are handled with great dispatch and surprising savings on TANNEWITZ VARIABLE SPEED BAND SAWS. And since they are available in any 3:1 speed ratio from 100:300 to 1000:3000 blade feet per minute, with instant adjustment to intermediate speeds, one machine serves ideally for cutting a variety of materials. Made with 30", 36" and 42" wheels.

Other models (single speed) for such purposes as sawing large blocks of aluminum and magnesium, cutting large steel templates, etc., are available in capacities and speeds to ideally accommodate work of practically any size or character. For complete facts write for bulletin on Variable Speed Band Saws. Also on request bulletins on: Sheet Metal Cutting Band Saws; DI-SAWS, combination band saws for sawing, filing and polishing.



THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

JOHNSON

FURNACES

Delivered in 1 week

TODAY, order your Johnson furnaces, and have them in your plant, ready to operate quickly. We give you delivery in one week.

No. 575 Pot-Hardening Furnace Fully Lined with 8" Insulation



Here's a pot-hardening furnace hard to beat. Fitted with automatic lighting device, No. 575 is heavily insulated with 4½" firebrick, backed up with 3½" insulating block. Lid-lifting mechanism easily raises cover and locks it in UP position. Burners are located near top of combustion chamber to insure longer pot life. Economical to operate. Large blower assures maximum performance. Steel pot 14" wide, 20" per-

\$375 F.O.B. Factory.
Also available in pot sizes 14 x 16,
and 14 x 18.

FREE

Write today for the
new Free Johnson Catalog.

Offices: 120 Liberty St., New York 6. Bourse Bldg., Philadelphia

JOHNSON GAS APPLIANCE CO.

623 E AVE. N. W.

CEDAR RAPIDS, IOWA

SEVERANCE MIDGET MILLING CUTTER GIVES PERFECT FINISH INSIDE INTRICATE CASTING



With a Severance Special Ball cutter, the hard-to-get-at flash edge on this aluminum elbow is quickly and perfectly removed.

Severance Midget Milling Cutters are efficiently finishing castings, parts and patterns made of metals, alloys, plastics and wood. With portable power tool, with stationary set-up or by hand, Severance Cutters do the finishing job cleaner, faster and easier. If you wish to speed up your finishing of manufactured parts send us samples. Our engineers will help you determine the kind of cutter best fitted to your needs.

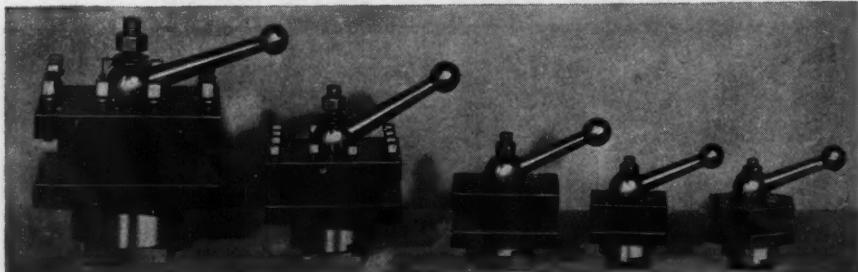
Severance complete line of "Carbide" Midget Milling Cutters are now available.

Severance

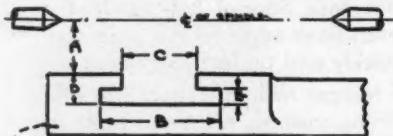
SEVERANCE TOOL INDUSTRIES INC., Saginaw,
Michigan. Plants in Long Island City, N. Y.;
Detroit, Mich.; Fort Wayne, Ind.; Chicago, Ill.,
and Los Angeles, Cal.

ENCO Turret Tool Posts

Accurate • Dependable • Cost-Saving



"A" Dimension range (from diagram on this page)		Model 6-S	Model 4-S	Model 3½-S	Model 2½-S	Model H
Lathe Swing		2" - 3 1/8"	1 9/16" - 2 1/2"	1 1/8" - 1 3/4"	7/8" - 1 5/16"	7/8" - 1 5/16"
Maximum tool bit size	1 3/8" toolholder for 3/8" bit (Where no tool bit size is specified, turret will be furnished for 1 inch tool bit)	10" swing & up	13" to 18" swing	10" to 13" swing	Bench Lathe	Bench Lathe
SPECIFICATIONS	4 tool 12 position 6" square Packed in carton Shipping Weight 35 pounds Price . \$99.00	1" or 1 1/4"	3/4" or 5/8"	1/2" Sq.	3/8" Sq.	3/8" Sq.
		(Where no tool bit size is specified, turret will be furnished for 6 8 inch tool bit)				



Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

One-week delivery on ENCO Turret Tool Posts made to specifications. When ordering, furnish all required dimensions and tool size desired.

- 12 position indexing
- 3 positions for each tool
- Carburized hardened steel construction
- Mounts rigidly in compound T-slot
- Keeps setting accurately
- Indexing is self-contained. Eliminates all chip interference

IMMEDIATE DELIVERY

on Turrets for these lathes:

Atlas • South Bend • Logan
Sheldon • Clauising

Also all models with semi-soft base on center post for quick adaption to your lathe.

Most ENCO dealers carry complete stocks of the above Turret Tool Posts and ENCO Tailstock Turrets. Chicago and New York offices too can make immediate shipment.

ENCO MANUFACTURING COMPANY, Dept. U

General Office and Factory:
3321-23 MONTROSE AVE., CHICAGO 18, ILL.

Eastern Sales Office: (Complete stocks carried)
118 E. 28th ST., NEW YORK 16, N. Y.

Not a Lemon in a Blue Moon

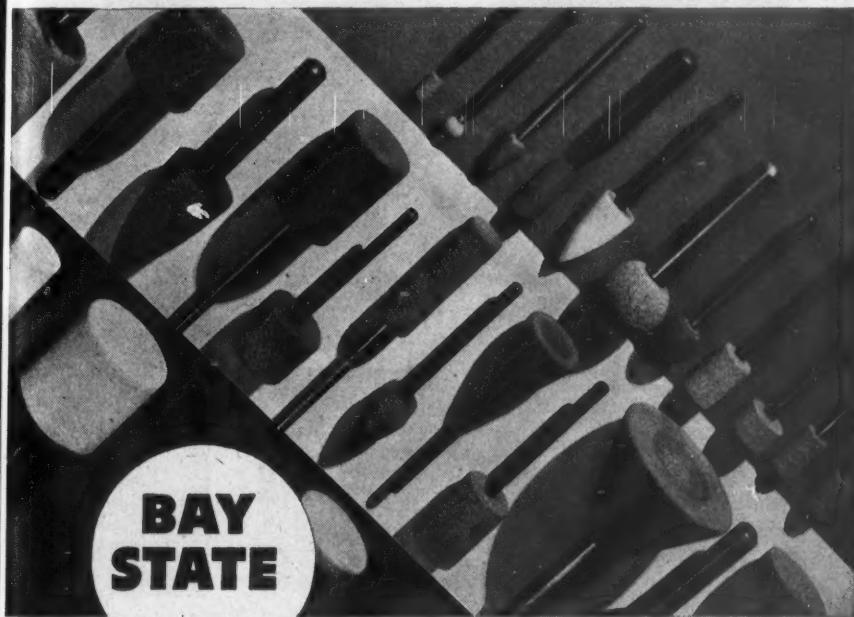
A very good reason exists why you'll have a hard time finding a mounted point or wheel with hard and soft spots among those bearing the Bay State *blue flash* trademark.

Bay State manufactures mounted points and wheels in *blank* form then shapes, trues and sizes them after mounting on the mandrel, in contrast to other makers' method of *pressing* into shape. The finished product is sharp, smooth-running the instant you touch it to the work — no wasteful "breaking-in" period required.

In a broad range of abrasive products, Bay State offers extra advantages...the finest honing and superfinishing stones ever manufactured...portable snagging wheels with extra safety features...precision grinding wheels in fractional grades...etc. Plus engineering assistance to help you get the most from grinding.

Do you have the handy, pocket-sized catalog of Bay State Mounted Wheels and Points? If not, send right away, for Catalog D.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.



**BAY
STATE**

BLUE FLASH GRINDING WHEELS *FAST
and COOL*



HONING AND SUPERFINISHING STONES



CUT-OFF WHEELS



INSERTED-NUT DISCS



AND CYLINDERS

PORTABLE SNAGGING WHEELS



MOUNTED WHEELS



AND POINTS



GRINDING WHEELS



The Collet that "Makes" Precision



Collapses 1/32 in.—Retains Gripping Strength and Accuracy.

Collet open at both ends.

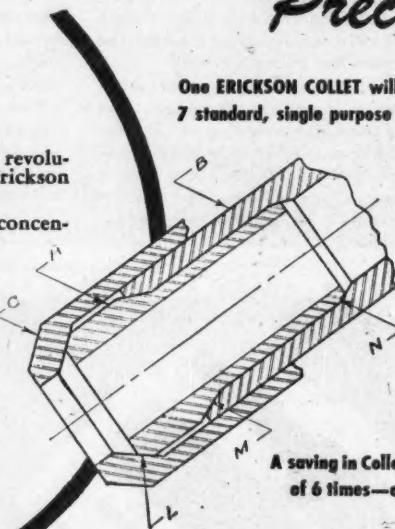
PRINCIPLE

The drawing (right) illustrates the revolutionary principles embodied in the Erickson Precision Collet Chuck.

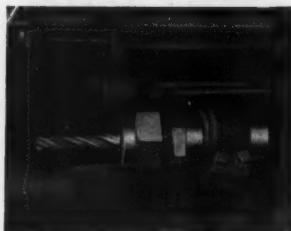
Collet "A" is automatically lined up concentrically with the axis of the Shank "B" by two Cam Surfaces of the Collet "M" and "N" mating with the Cam Surfaces of Shank. The Shank and Collet Cam Surfaces are mated to within .0001 inch.

This action aligns Collet with the Axis at the Center of Shank, allowing it to be drawn back by Collet Cam Surface "L" and Nose Piece "C".

Due to the fact that collet is open slotted at both ends, Collet "A" then collapses equally throughout its length to maintain a vise-like grip and remain in perfect alignment with the Axis of Shank.



A saving in Collet expense of 6 times—or more.



Model 402 Chuck in use on Automatic Screw Machine. Drill gripped on flutes.



Special Model 202 Chuck used in Hand Drills in Aircraft Industry. 01 Models are regularly recommended for Hand and Air Drills.



Model 201 used in drill press. Extra long drills can be used, by extending them from the chuck as they wear.

Send for Bulletin E giving complete information and additional photographs of uses

ERICKSON STEEL COMPANY

The ERICKSON COLLET CHUCK**

Model "01" accurate within .0005 or less at the nose.

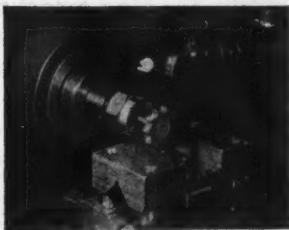


Models 102 and 402 Chucks in use on Automatic Screw Machine.

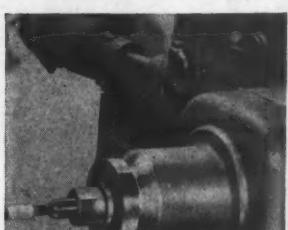
Model "02" accurate within .001 or less at the nose.



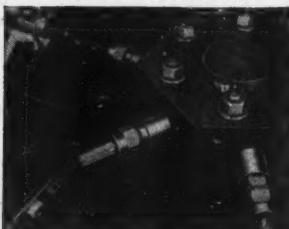
Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.



Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.



Model 301 Chuck designed for high speed internal grinding operations.



Model 102 Chucks for drilling and tapping operations on Turret Lathe. Jobbers Drill stubbed on chuck in foreground.



Tool Post Grinder equipped with Model 301 Chuck.

2309 Hamilton Ave., CLEVELAND 14, OHIO

TAPPING TIME

IS
ALL
THE TIME



ment and the right style of tap for the work to be done.

Add to Winter Precision TAPS made by skilled craftsmen, the Engineering Service Winter Brothers are equipped to give you, and your tapping operations should go through the shop in the shortest possible time, and with an output per tap of gratifying proportions.

TAP & DIE DIVISION of THE NATIONAL TWIST DRILL & TOOL CO.
Detroit, Michigan

With WINTER Precision TAPS on the job. No down-time if you follow good, but simple tapping practice — sharp taps; plenty of lubrication; tap and hole in proper alignment.

Winter Brothers

COMPANY
BRANCH STORES



Wrentham, Massachusetts, U.S.A.

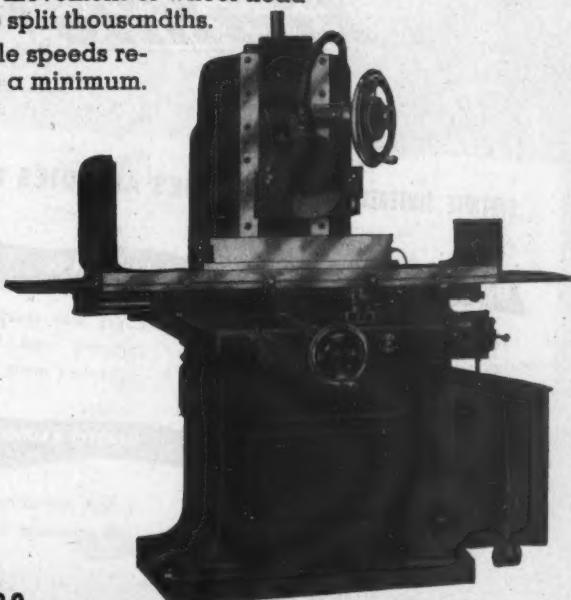
SAN FRANCISCO CALIFORNIA-CHICAGO ILLINOIS-DETROIT MICHIGAN

Hydraulic
feed

GRAND RAPIDS Surface Grinders

*To Meet 1944's Exacting
Needs --- as nothing else can*

- "Grand Rapids" Hydraulic Feed Surface Grinders guarantee tool room accuracy at table speeds up to 125 feet per minute.
- Heavy rugged one-piece column and base casting assures permanent alignment between the cross travel ways and the upright head.
- Patented vertical movement of wheel head makes it possible to split thousandths.
- Two usable spindle speeds reduce wheel costs to a minimum.



WRITE FOR
CATALOG GL-100

No. 35 Precision Tool Room Type

GALLMEYER & LIVINGSTON CO.

308 STRAIGHT AVE. S. W.

GRAND RAPIDS 4 MICHIGAN

MEET YOUR POST-WAR PRODUCTION DEMANDS WITH *Firwhite!*

FIRWHITE SINTERED-CARBIDE PUNCHES AND DIES WILL GIVE YOU:

Better Product

Less burring, distortion, and buckling; more uniform accuracy; better finish—smoother edges and surfaces.

Longer Life

Edges stay sharp longer; resist chipping and breaking. Life multiplied many times!

More Production

Less idle time for changes.

Greater Economy

Lower cost of maintenance; fewer resharpenings than any steel dies.

Firwhite-Sterling

STEEL COMPANY

Offices: BRIDGEPORT, PA. - NEW YORK - BOSTON - PHILADELPHIA - CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES

Makers of High-Speed Steels, Tool and Die Steels, and Sintered Carbides

FIRTHITE PUNCHES AND DIES FOR:

★ PERFORATING



★ BLANKING



★ SLOTTING



★ SLITTING



★ CUTTING OFF



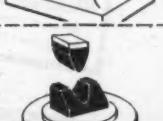
★ SHAVING



★ NOTCHING



★ FORMING OR BENDING



★ TRIMMING



also laminating, burnishing, curling, piercing,
crimping, planishing, broaching, swaging, etc.

Please furnish this information
when you request quotation on
Firthite Punches and Dies:

Assembly blue print of present
method;
Detail blue print of existing
punches and dies;
Description of material punched;
Type of press (full details);
Type of die holder, sub-plate
details, etc.



Firth-Sterling
STEEL COMPANY

Offices: MCKEESPORT, PA. NEW YORK • HARTFORD
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CHICAGO • LOS ANGELES

Wagner

HYDRAULIC BRIDGE BRAKES

make crane operation safer and easier..

as expressed in the letter reproduced below, received from a mill worker employed in the plant of a well-known company.*

Wagner Electric Corp.
St. Louis, Mo.

Dear Sirs. Recently a Wagner hydraulic brake was installed on a over-head crane I operate. This brake transformed my job from a nerve wracking grind, to a pleasant days work. No more brake chatter and vibration, which caused a break down ever so often, holding up production, as well as a tired out sick feeling at the end of every shift. With the Wagner hydraulic brake, I now can come to a smooth as well as an emergency stop, and depend on it to do just that. Anyone who operates a crane with a fairly fast runway speed, and averaging 300 lifts per shift would appreciate how important this is. After a dozen years of this work I find I enjoy doing it, thanks to your brake. Your company as well as mine are to be congratulated. You for building a fine piece of machinery, and my employer, for using the best.

*Name and address of writer will be sent upon request. (This letter is reproduced exactly as written).



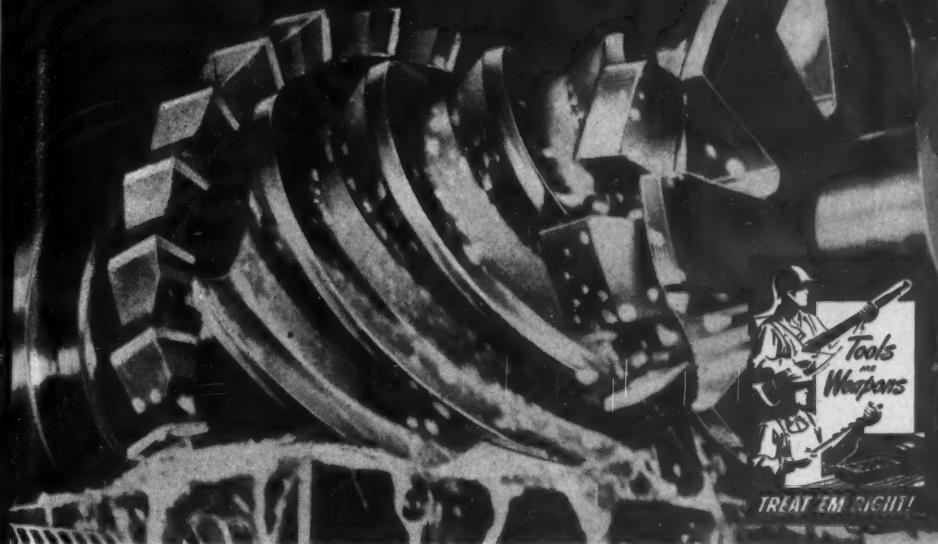
144-2

WRITE FOR BULLETIN IU-20

Wagner Electric Corporation

ESTABLISHED 1891

6448 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS



GOOD CUTTERS CAN MEET TODAY'S PUNISHING DEMANDS — BUT THEY NEED CARE TO DO IT.....

1. Use the proper spindle speed. Remember small cutters need faster speeds.
2. Maintain the correct clearance for material being machined.
3. Use collars of the same diameters on each side of saws or thin milling cutters.
4. Clean shanks of arbors and adapters.
5. Use adequate arbor support.
6. Clamp work securely.
7. Mount cutters as close as practicable to spindle.
8. Use sharp cutters — a dull cutter wears excessively.

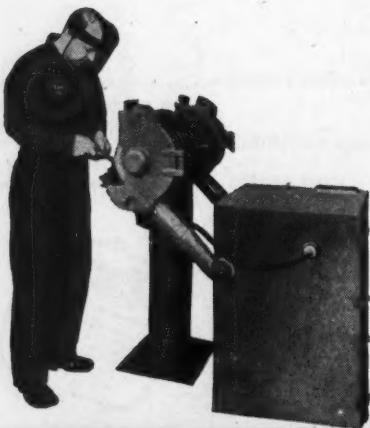
These simple suggestions will help cutters maintain high production rates and give long wear — and aid in delivering a greater volume of armament to our fighting forces.



BROWN & SHARPE CUTTERS

IT'S NO TRICK
AT ALL
WITH

TORIT



TORIT DUST COLLECTORS

This "cutting" job raises no dust but in industrial cutting, grinding and polishing operations dust is a menace, endangering employes' health and valuable machinery.

TORIT Dust Collectors trap this dust at its source. Portable, and completely self-contained, they fit into present production layouts and can be easily moved to meet new conditions as they arise. For complete information write:

TORIT MANUFACTURING CO.
296 Walnut St.

St. Paul 2, Minn.

TORIT **Dust Collectors**
SELF - CONTAINED UNITS

The new, different
lubricant and coolant

Lubricoolant

The new, different lubricant and coolant.

The first entirely new approach in twenty-five years!

Makes 5 tools do the work of 7 . . . 40% increase in tool life.

Absolute freedom from rancid odors . . . Eliminates dermatitis.

Holds work at levels not measurably above room temperature.

Completely water washable . . . no solvents or alkalies needed.

Transparent, not a milky opaque fluid. Better visibility means greater accuracy.

No decomposition . . . no gumminess . . . will not foul the flow lines or clog filters.

Produces mirror finish on all types of metals from aluminum to molybdenum steel.

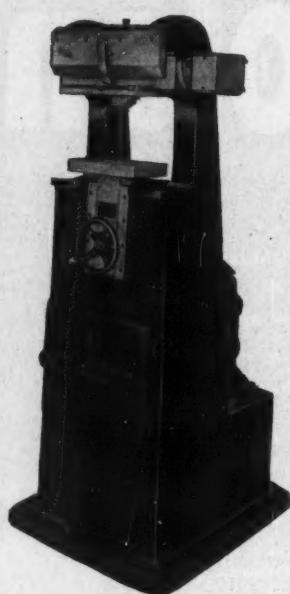


THE DU BOIS COMPANY

CINCINNATI - 3 - OHIO

(In the Heart of the Machine Tool Industry)

TRAINED SERVICE MEN AND WAREHOUSE STOCKS IN ALL PRINCIPAL CITIES



MODEL 175

PART NUMBERS LETTERING GRADUATIONS ROLLED BY MACHINE

ON FLAT *and* ROUND SURFACES

Sure - Fast - Accurate
OBSOLETE HAND STAMPING

SAVES [PARTS
LABOR
STAMPS

Eliminates POOR MARKING
ERROR — NOISE

Speeds . . . DELIVERIES

ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.
1806 BELLE PLAINE AVENUE CHICAGO 13, ILLINOIS

TOOLS FOR TRANS-HEMISPHERE TRANSPORTATION



Because their routes are globe-shrinking in scope, Pan American Airways must service their planes with only the finest equipment. That is why Cleco Aircraft Tools are used extensively in Pan American maintenance work. Illustrated is a Cleco No. 123 Drill used at their huge new hangar at Miami.

Cleco tools for aircraft maintenance and production include literally hundreds of styles of drills, riveters, squeezers, screw drivers, nut setters, etc. We make Cleco Type "P" Sheetholders which are *triple-safe*—non-flying. Also immensely popular is the Cleco RIV-N-JECTOR—a rivet-holding magazine that reduces rivet dropping 90%. *Bulletin 85, enlarged and revised, describing all these products in detail, sent immediately upon request.*

POPULAR CLECO AIRCRAFT TOOLS



41C Squeezzer

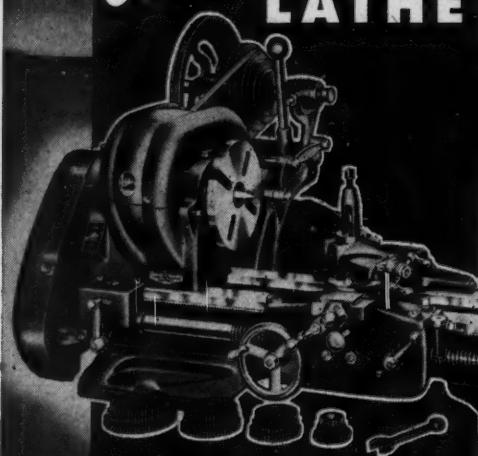


Riveter with SW Handle



9DPI0 Drill

Atlas 10-INCH LATHE



CONDENSED SPECIFICATIONS

Swing over Bed 10^{1/2}"
Swing over Carriage 6^{1/8}"
16 Spindle Speeds 28 to 2072 RPM.
Thread Cutting Range 4 to 96 per in.
Four Bed Lengths 18" to 36" centers

Precision for Invasion . . .

When the day comes and our boys pour ashore for the last big smash, accuracy born on the production line will give them the winning punch. For precision-wise industry has been satisfied with nothing less than the best in the quality and quantity of American weapons.

In thousands of war plants where Atlas Machine Tools are specified, they have increased production "firepower" by taking over production of small parts so that capacities of larger machines were not wasted.

The Atlas Lathe, quickly converted for hand screw machine work, has proved its ability to deliver split-hair precision under the most grueling production schedules. Massive precision-ground bed, reversible automatic power cross and longitudinal feeds, quick-change countershafts, and custom built spindle bearings are but a part of the story of its modern, compact design.

The low-cost Atlas 4 Tool Team for Victory will be a combination equally hard-to-beat in peace. You can use it for extra production right now . . . for quick conversion later. Write for full details and the address of our nearest representative. Atlas Press Company, 246 North Pitcher Street, Kalamazoo 13D, Michigan.



4 Atlas TOOL TEAM FOR SMALL-PARTS MACHINING



OTC TOOLS

for MACHINE MAINTENANCE

SIGNAL
CORPS
PHOTO



At the Front—helping to keep fighting machines *on the move*.

In War Plants—maintaining machinery at full efficiency.

On Farms—keeping tractors and implements *on the job*.

War Service has proved the dependability and sturdiness of OTC Tools. Available on proper priority. Write for Bulletin.



WORK FOR VICTORY



OWATONNA TOOL COMPANY
OWATONNA MINNESOTA



For use on
EX-CELL-O
JONES &
LAMSON
DALZEN
and other thread
grinders

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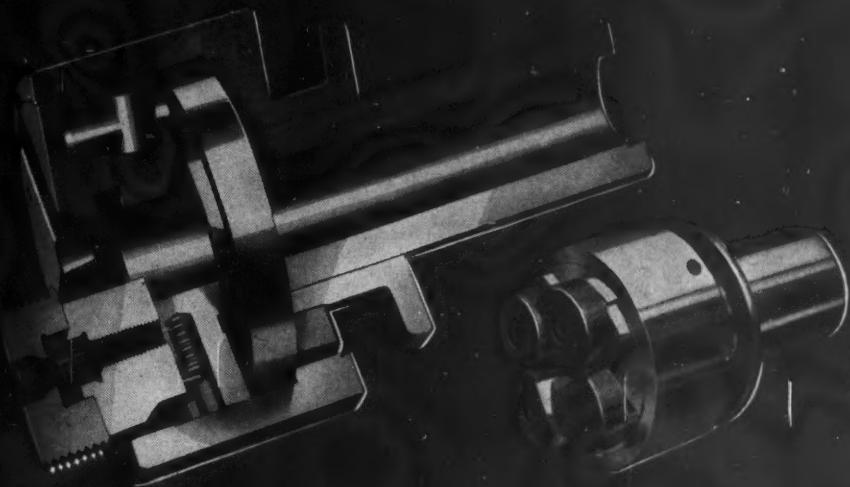
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wheels that grind
WHITWORTH
BUTTRESS
ACME
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and any special
form, groove or
standard thread.

WHEEL TRUEING TOOL COMPANY

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Detroit 6, Michigan



SIMPLICITY DOES IT!

Simple in design—that's the main reason for the strength, precision and unvarying performance of Nameco Circular Chaser Dieheads.

Adjustment for all four cutting tools is quick and positive—through only two screws—and adjustment "stays put".

When Circular Chasers need replacement, a duplicate set can be inserted in head in two minutes. No trying for size, no delay, no spoiled work. Uniform production is maintained on long run lots of straight or taper threads on pressure-tight fittings.

Circular thread chasers ground to gauge accuracy, may be reground through 270° circumference—they last ten to fifty times longer!

Chasers and blocks may be interchanged with circular hollow mills in the same double-duty head. Heads are available for both stationary and revolving spindle machines—capacities $\frac{1}{16}$ " to $4\frac{7}{8}$ ".

Here are the most efficient threading and hollow milling tools made—for a wide variety of work on all standard automatics. Catalog D-42 gives details.

THE NATIONAL ACME co.

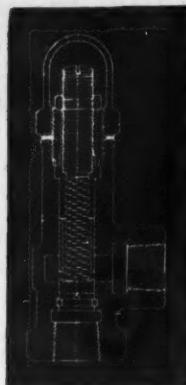
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NON-CHATTERING.

Standard or flanged. Cast iron or brass bodies. Brass, hardened or stainless steel pistons. Pressure from 0 to 350 pounds.

Write for data book



Model FHM
Horizontal Type

CENTRIFUGAL COOLANT PUMP

Types for every purpose . . . or special models if needed. Motor, direct or belt drive. Pipe sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ ".

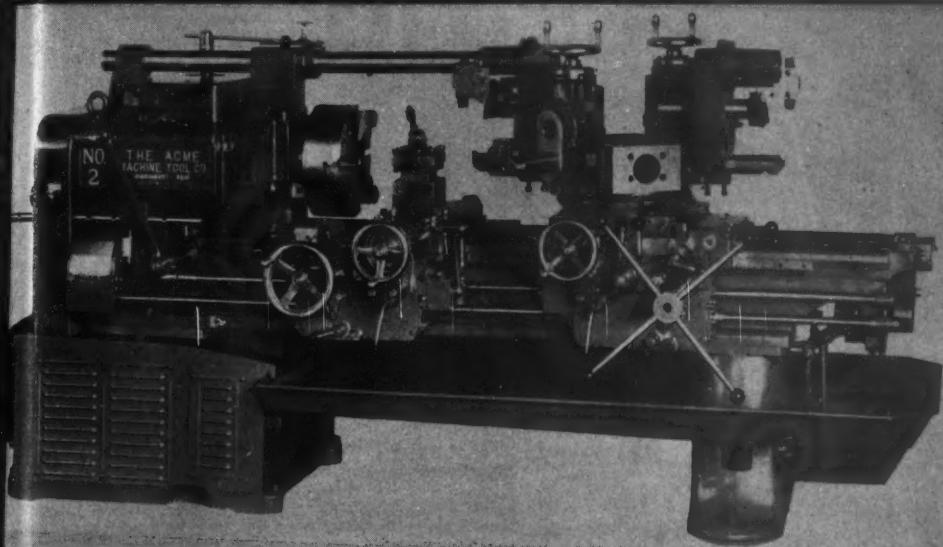
THE



Specialties Co., Inc.

BLANCHESTER, OHIO

**For Maintaining Rigidity and Accuracy
under Heavier Cuts at Faster Speeds**



No. 2 CINCINNATI-ACME Universal Turret Lathe with Heavy Duty Turret Tools

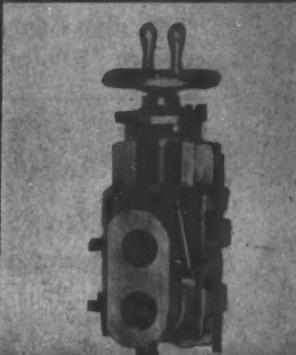
Here's a turret lathe—designed to take heavier cuts at faster speed with cemented carbide cutting tools. The new heavy duty turret tools supported by 3" diameter stationary overhead pilot bar are designed to furnish maximum rigidity and accuracy.

Multiple Turning Head—With reversible cutter holders available for the Multiple Turning Head, the turning range of all 5 holes overlap each other.

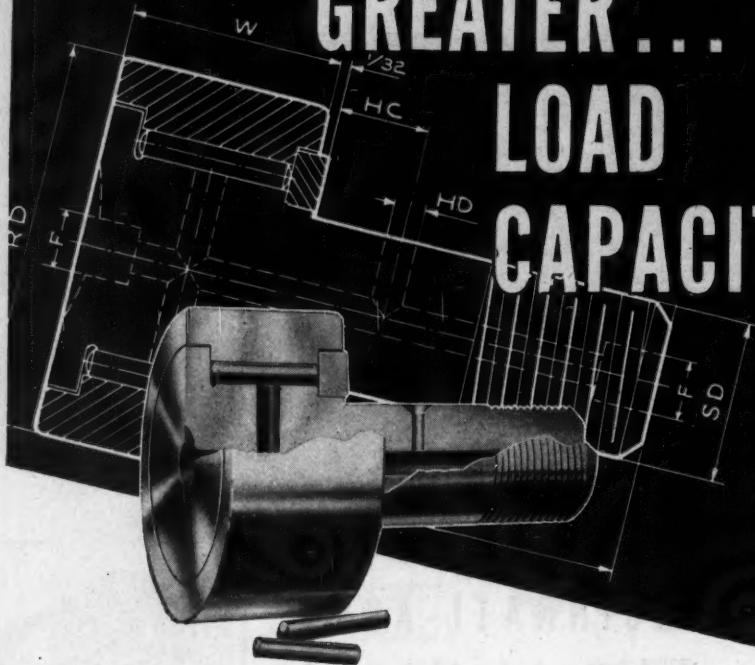
Slide Tool—The larger and heavier slide tool has a 6" diameter dial graduated in .001, stop screws and positive binder clamp.

Write for complete details.

**THE ACME MACHINE TOOL CO
CINCINNATI** OHIO



GREATER... LOAD CAPACITY



McGILL Cam Follower Full Type Roller Bearings have a greater load carrying capacity for a given overall width, and occupy relatively little radial space, as compared with plain bearings and ordinary ball bearing cam followers. Added advantages include effective sealing and the absence of small retaining washers or otherwise delicate extra parts. McGill Cam Follower Roller Bearings are made in a variety of sizes. Write for Bulletin No. CF-40A.

BEARING DIVISION — 1500 N. Lafayette St.

McGILL

MANUFACTURING CO., INC.
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ANOTHER KENNAMETAL FIRST!

New KENNAMETAL Lathe File Produces Sensational Results

One KENNAMETAL LATHE FILE removed the burrs from 100,000 shells as compared to 800 to 1,000 shells by a steel file—a production ratio of 100 to one!

Just as the introduction of KENNAMETAL-tipped milling cutters in 1939 is revolutionizing the milling of steel, the NEW KENNAMETAL LATHE FILE promises to establish new standards of efficiency and economy in the filing of steel and other metals. For example . . .

- ★ KENNAMETAL Lathe Files permit filing speeds of 3 to 10 times that possible with steel files, matching the unusually high cutting speeds of KENNAMETAL carbide tools.
- ★ KENNAMETAL Lathe Files do not burn up at high speeds but outlast steel files 50 to 200 times.
- ★ KENNAMETAL Lathe Files cut hardened steels up to 62 Rockwell C which the ordinary file will not touch . . . do a noteworthy job on cast iron and brass at surface speeds around 900 feet per minute, and efficiently file high-carbon, high-chromium steels at 800 surface feet per minute.

At present, KENNAMETAL LATHE FILES are available in one size—Style F-76, illustrated. It is 11" long, $\frac{3}{4}$ " wide, and $\frac{3}{8}$ " thick, having a substantial filing surface 4" long of grade K4H KENNAMETAL (80.6 Rockwell C), single cut with teeth at 30° shear angle, 40 per inch. Shank is shaped for convenient handling.

PRICES—1 to 9 files . . . \$15.00 each
10 to 99 files . . . \$13.00 each
100 or more . . . \$12.50 each
F.O.B. Latrobe, Penna.

You too can save time and reduce costs with KENNAMETAL Files. Order one today and prove its merits for yourself.



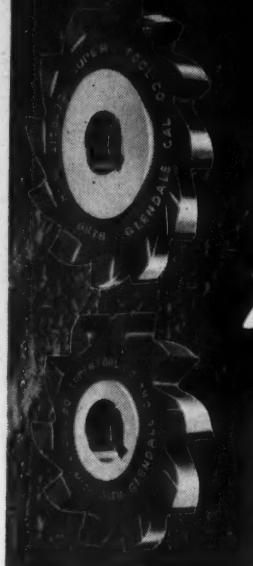
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PRICES DOWN

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ON

**SUPER CARBOLOY
TIPPED
Milling Cutters!**



Here's money-saving news for production men! A 25% price reduction on Super Carboloy Tipped Standard Milling Cutters! Think of it! Now you can get the speed, accuracy and dependability of these high quality cutters at prices that mean *extra economy* on all types of production jobs . . . long runs, short runs, even general shop tooling.

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TOOLS FOR**

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Spotfacing, Forming,
Grinder Rests, Wear Parts,
Boring, Drilling, Grooving,
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Purposes

How is this price reduction possible? You'll find the answer in our plants—engineering research and development, improved manufacturing techniques, increased production. And we are passing these savings along to you.

If you haven't yet tried Super Carboloy Tipped Milling Cutters, now is the time to do it! You'll learn first-hand why production men the country over who are interested in stepping up production and stepping down costs, specify SUPER. Write TODAY for complete details as to descriptions, sizes and new low prices.

All sizes available from stock for immediate shipment

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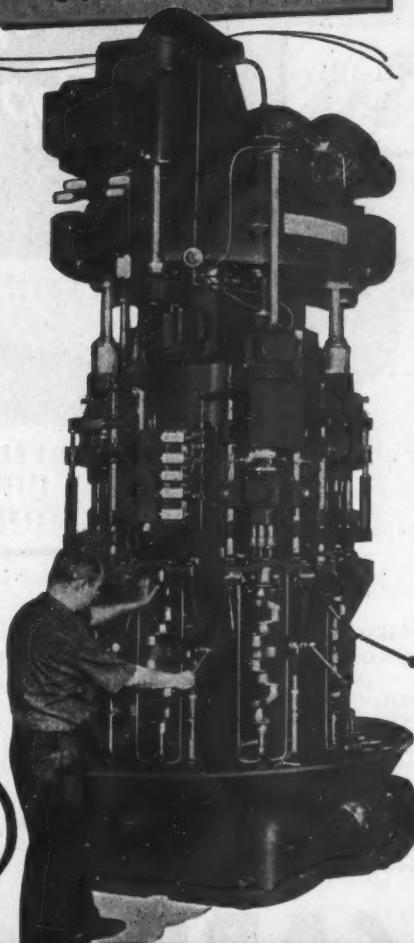
Still another PRODUCTION INCREASER

Special Delivery
FROM SOMMER & ADAMS

8-SPINDLE ROTARY INDEXING DRILLING, REAMING, TAPPING MACHINE

Still another example of special design by Sommer and Adams to fill a special purpose — an 8-spindle machine, central column type, with multiple heads for drilling, tapping, countersinking and reaming holes in crankshaft flanges. Operation is entirely mechanical and electrical. Heat-treated drive gears, hardened and ground worms, and hard bronze worm gears suggest superior materials and workmanship. A machine that gives production plus accuracy.

*The
Sommer & Adams Co.
places at your command a
25-year acquaintance with the
intricacies of special machine
design and construc-
tion.*



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Custom-Built EQUIPMENT FOR MANY PURPOSES

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FULL-SIZE
TIPS

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STANDARD CARBOLOY TOOLS

Give You
Top Quality!
Top Performance!

... at prices comparable
to all types of Cutting
Tool Materials

CARBOLOY
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COLD-DRAWN
STEEL
SHANKS

THESE FEATURES MEAN
LONG TOOL LIFE, EXTRA
TOOL STRENGTH,
GREATER ADAPTABILITY
TO SPECIAL SHAPES

THESE are the quality features you get with
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Cold drawn steel shanks—with the strength
to "take it" on even the "toughest" jobs. Full-
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Standards are available to you at prices com-
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